

AVIATION WEEK

A McGRAW-HILL PUBLICATION

FEB. 8, 1954

50 CENTS

TARGET FOR THE JET AGE



The jet-powered target you see here is the Ryan Firebee.

It's half the size of a jet fighter, and is used to simulate jet plane maneuvers in training anti-aircraft gunners and interceptor pilots.

After a run the pilotless drone is lowered by parachute—to be in condition to fly another day. The Firebee is a joint development of the Air Force, Army and Navy.

An important reason behind the drone's success is her autopilot. Made up of components of the famous Honeywell E-6, the Firebee's special autopilot flies her at the command of a radio operator who's often far out of sight on the ground.

New uses are continually being found for the various Honeywell autopilots and their components that have been proven by many millions of air miles. They're backed by experience gained in manufacturing more autopilots than any other company in the world. Autopilots are an important item in our complete line of controls for everything that flies. This line will continue to expand because automatic control is important to aviation's progress. And *automatic control* is Honeywell's business.

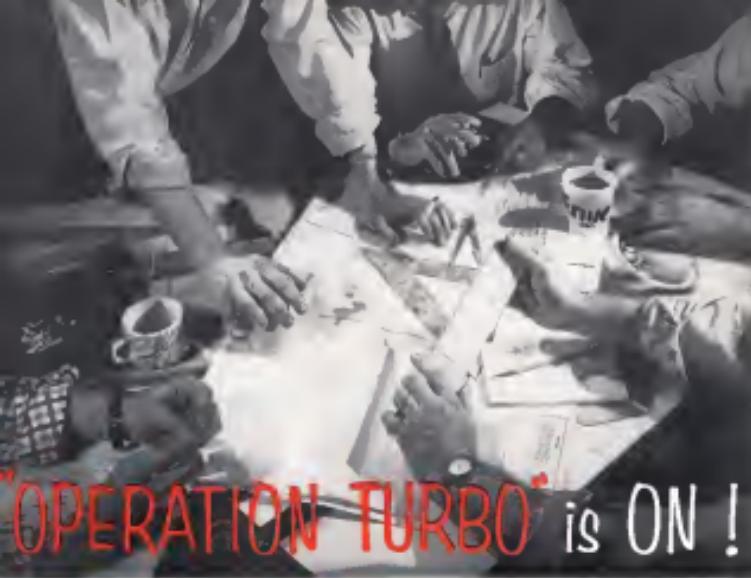


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"OPERATION TURBO" is ON!

An intensive program of Turbo-Machinery development is under way at Hydro-Aire.

As in a wartime Task Force, the organization has been planned, personnel selected, equipment procured on the basis of maximum efficiency for the job to be done. The organization is new, the equipment the very latest that can be obtained. In contrast, the men themselves provide an accumulation of experience that goes back many years before Hydro-Aire came into being.

These men represent decades of research, development and practical operation in the field. One or another has held a key position with every leading turbine manufacturer in the country. Among the things that have attracted them to Hydro-Aire is the scope offered by this young, dynamic company. Perhaps for the first time in their careers they are free to give their abilities full rein ... to realize their full potential.

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EVERY FIGHTER, EVERY BOMBER, EVERY TRANSPORT IS HYDRO-AIRE EQUIPPED



Tough Braniff problem solved by B. F. Goodrich dimpled tire

In steered aircraft tire landing gear, the very gentle and minimum overtravel required was playing havoc by causing tire wear for Braniff International Airways. They accepted 200 miles of runway—since it is B. F. Goodrich Could we design a tire that would reduce rolling by three hard gears?

The two BFG engineers developed a new tread with other changes to give a longer wearing tread and a tire that could be re treaded many times. The dimpled tread provided better distribution of the load and reduced exposure to road curving. The longer lasting road construction hangs over through rough landings in condi-

tion for areas and easier retying. Braniff men reduced 36% to 50% road damage with the new tire.

They soon became standard equipment on Braniff's DC-3s, 4s, and 6s. And, of course, they're on the new Braniff Super Convair 340s. Twenty-three other airlines have also made B. F. Goodrich dimpled tires standard equipment—say on the basis of their own testing programs.

B. F. Goodrich is now producing the new dimpled tire in all popular airline sizes. It's another firm in aviation tires from B. F. Goodrich, leader in rubber research and engineering.

Send this coupon if you would like

more information about BFG tires or other stress-tested products. Check the areas, print your name and address on the margin below (or pin to your company letterhead).

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Mail to: The B. F. Goodrich Co., Dept. 100, Akron, Ohio

First carrier-based airplane

to hold a world's speed record

753.4 m.p.h.

the U.S. Navy's

Douglas F4D Skyray

Breaking each mile in less than 5 seconds, during four passes of a 3-kilometer course, a Douglas F4D Skyray shattered the official world speed record for the United States.

Two weeks later, Skyray-based record 160-kilometer course, cracked old records

by an even wider margin. Now, or pre-diction for the Navy, this delta wing aircraft's 753.4 m.p.h. dash record dash and record in speed—plus the ease of handling needed in carrier landings. The Douglas F4D Skyray has now passed its initial carrier trials, is service will proceed

on from against the forces of modern jet technology.

Performance of the Navy's F4D Skyray is a welcome example of Douglas leadership in aviation. Faster and farther with a larger payload is always the basic rule of Douglas design.



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First in Aviation

Domestic

Fiat C-124B, turboprop version of the Douglas Globemaster, completed its initial flight last week, taking off from Long Beach, Calif., and landing at Edwards AFB for part of test program. The C-124B is powered by four Pratt & Whitney Canada PT34-51s, capable of developing equivalent 10,700 hp each at 10,000 ft and giving the transport 60% more power than the conventional Globemaster.

Third major aircraft carrier will be built for Navy by Newport News Shipbuilding & Co., Dock Co. of Virginia, awarded the contract last week, in a fixed-price bid of \$117,750,000. Full cost total cost of the \$68,000 ton ship \$132 million. This compares with \$218 million for the Forrestal and \$212.5 million for the Saratoga.

Flying Tiger Line planes, represented by ALPA and Shik Aviatsia Flots Azi, have signed an agreement for integration of their security nets, clearing the way for CAA approved merger of PTI and Shik and making a four-week dispute between the two unions. (AVIATION WEEK Feb. 1, p. 77)

Jet-powered P2V-7 is full production at Lockheed Aircraft Corp.'s Berbank (Calif.) plant under a new Navy contract. Prototype submarine killer has two Wrights 2500-hp matched air-swing pods (p. 8), supplementing two Wright Turbo Compound powerplants.

Pan American World Airways has become the first airline to put Salkol (selective radio calling system) into operational use. The new system—developed by 21-months—enabled ground stations to flush a flight on individual air craft circuits to contact transports, forcing plane crews from communications radio on landing.

Robert L. Bixby, former chief of National Bureau of Standards Project Tinkerbell (atomic factory), shortly will join American Car & Foundry's new Electronics Division. The appointment is further evidence of AC&F's interest in setting up a Tinkerbell-type plant. (AVIATION WEEK Feb. 1, p. 11)

Lt. Cmdr. George W. Fer is now technical information officer for Navy's Bureau of Aeronautics, replacing Lt. Cmdr. Frederick M. Lloyd, who is leaving after two and a half years in the post to attend the Armed Forces Staff College at Norfolk, Va.



Latest Portrait of U.S. Research Family

Since Air Force, Navy and NASA research planes provide a variety of configurations in this group, planes taken at the USAF Flight Test Center Edwards AFB, Calif., where the craft are being flown to gather data for defense designs. In center is a modified, jet-powered Douglas X-1A, designed for enhanced flight at high speeds. Below, on the left, is the sleek Bell X-1A rocket plane, which has flown more than 1,600 mph at jet power. Douglas D-558-2 Skystreak, maximum speed 670 mph, is a jet-powered Douglas B-52B. Skystreak (bottom) has reached more than 80,000 ft and the little nose jet Northrop X-4, which explores stability and flight characteristics of everything configuration at transonic speeds.

Cook hearings will be held by CAB at Shepperton, Ind., Feb. 10 in an effort to determine why a Grumman Mallard plunged into a lake shortly after takeoff Jan. 16, killing two Grumman employees (Dowdell, E. Baum, Jr. and 11 others). (AVIATION WEEK Feb. 1, p. 20)

Porter Boeing B-47s of Strategic Air Command's 311th Medium Bomber Wing will fly a nonstop flight south from Barksdale AFB, La., to a forward Field Air Division base in French Morocco for 60 days of orientation training. The Stratobombers will refuel in flight from Boeing KC-97 tankers.

Charles G. Hebbold, Jr., 43, vice president of Air Transport Avia, died last week at Barksdale, Md. (p. 11)

Financial

Grumman Aircraft Engineering Corp., Bethpage, N. Y., reports record positive net earnings of \$7,120,340, compared with \$5,340,341 in 1952 and the previous peak of \$9,590,000 in

1948. Sales and other income totaled \$24,014,530, an increase of \$26,366,479 over last year.

International

De Havilland Comet 2 has flown from Johannesburg, South Africa, to Johannesburg, South Africa, in 6 hr 17 mins., averaging 610 mph. On the 2,993-mile round trip, the aircraft suffered a slight loss of the jet boosters. Two British jet test and the London Shortcross flight last month (AVIATION WEEK Feb. 1, p. 16) under an average of 2,200 hr as the typical stage length with a capacity payload of 33,500 lbs, with usual allowances for headwinds. The Series 2 completed the London Shortcross flight with sufficient fuel in its tanks for a 600-mi diversion and a 10-min holding at an alternate stop.

Japan Air Lines has inaugurated nonstop, 29 hr scheduled DC-6B passenger service Tokyo-Sao Paulo, based on their Comet 2 flight results around Tokyo-London and Tokyo-Sao Paulo early next summer.

ELEVATOR FEEL TRIM Airborne Actuated on Navy's F2H-3



The elevator feel trim system in this McDonnell jet is actuated by Airborne's Model R-1445M12-4 LINEARATOR. A ball bearing pack-screw actuator like this one can operate at 11 inches per minute with an 800 lb load on either tension or compression.

The "T" type LINEARATOR fits many situations where light weight and close length for a given stroke are desired features.

Perhaps you have a similar application. Our literature in the U.S. Aeromarine Engineering Catalog gives detailed data on LINEAR and other actuators manufactured by AIRBORNE.

AIRBORNE
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The Aviation Week

February 8, 1954

Headline News

Supersonic Comet Jets CAR on Schedule
AF Gets 100s to Buy F-100s
C-124 Globemaster Gets
AMM-1 Helicopter
Mitsubishi Starts
New Windtunnel Open in Industry
Air Industry Leaders Optimistic
Transonic Flow in 1954 Plane Studies
T-33 Aircraft Sustained Service
New Air Arms
CAB May Speed Mandated Study

Aeronautical Engineering

Aerospace Bureau Edits To Take Action
How to Predict Extreme Gust Loads
Summaries of 108 Papers

Aeronics

Air Arm Starts Tough Aviation Jobs

Equipment

Tooling Troubles of Air Ducts

Air Transport

CAB Buys Sixty Two
Markets Want Tugboats CAB Cancels
Markets Also Want Large
Dare Politics Sets CAB Vetting
LA Airport Fight for Expansion
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AA Starts E&L Action on Metric

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Picture Credits

T-33A/P, E-3 (top) Lockheed; Convair's
Convair 880, (bottom) GE; 18-Stage
Wright R-3350-10, (bottom) GE
Lear, 28-Stage Approach Set, 28-Stage
Hastings-GE-1000 Model, (bottom) GE
AVIATION WEEK

THIRD INTERNATIONAL AVIATION TRADE SHOW MAY 5, 6, 7, 1954

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Aviation has room for new products. It demands greater precision and reliability. It needs services of all kinds. It needs the industry of the nation.

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NEPTUNE DOES 280 MPH WITH FROPS FEATHERED—Sideview view of Lockheed P-IV-5, with an auxiliary 3,000-lb thrust Wrights J44 under each wing, flying at 200 mph, feathered wings on jets with prop of Wright Turbo Compound feathered

New U.S. Aircraft and Missile Developments



NO FUTURE FOR T-33—Despite reports that Convair is competing for a procurement contract for a transonic version of the B-36A, shown is exclusive first photo of Wichita, industry observes the plane will not be produced. Future shows first T-33s immediately after USAF let you know if Rock and Convair contract for a large number of the planes.

CARRIER LAUNCHES REGULUS MISSILE—Convair's Regulus supersonic missile takes off from the deck of USS Princeton (below left) with aid of rocket booster. Launching setup for missile is detailed (below right) prior to flight.



WHO'S WHERE

In the Front Office

Henry A. Bruno has been elected president of H. A. Bruno & Associates, newly incorporated. The firm's offices are in New York. Raymond D. Clegg, formerly managing director and chairman of British Philips and Thomas Wright, are vice presidents.

Walter Baldwin and Hans Gonda, founders of Pacific Scientific Co., have retired from active duties with the Los Angeles organization. Other officers are Howard D. Clegg, chairman; E. C. Cleary, president; Curt W. Bohem and Joseph J. Nocki have established Tech-Pacific Corp. at Newport Beach, Calif., in distribution of U. S. and Swedish precision machine tools in U. S. western states.

Paul H. Fry has been appointed vice president-engineering of National Co., Milpitas, Calif.

Edwin F. Fritts has been elected first vice president and John S. Gonda is now second vice president of Ameri-Copter Co., Detroit.

Roger W. Fussell, president of Flying Tiger Line, has been elected a director of Southwest Bank of Memphis, Calif.

Changes

Dr. G. B. Schlesinger, former chief of the aerodynamics section of National Bureau of Standards, has been named chief of the new fluid mechanics section.

Frederick C. Franklin, former (USA) Air Force, has been appointed manager of San Francisco Airport, succeeding George M. Davis, who resigned to enter private interests.

Allen Chaffee is new chief engineer for Wisconsin Motor Car Co., Aviation Gasoline Division, Philadelphia.

Monte V. Gilbert, former chief of NASA Bureau of Aerospace guided missile branch, is new chief engineer of the Test Division of F. K. Moller & Co., Indianapolis.

Robert J. Coughlin has been promoted to assistant manager of the product and structural analysis department at Aerospace Research Foundations of Illinois Institute of Technology, Chicago. Ernest B. Fossel has been appointed senior research engineer.

Col. Paul H. Koenig (USAF Ret.) has been chief designer in Ryan Aircraft Co.'s Propulsion Division at San Diego.

Honors and Elections

José H. Rodriguez, head chairman of North American Aviation, has received this year's highest civilian award, the Order of "El Merito de la Republica Dominicana, for his outstanding achievements in the aircraft field.

Arthur F. Meisterhuis, meteorologist in private life, American Airlines, is now president of the American Meteorological Society.

C. D. Bradley, president of manager of Advanced Manufacturing Co., has been appointed as president of the Personnel and Industrial Relations Area of Los Angeles

INDUSTRY OBSERVER

► Work other aircraft have been experiencing interest in buying 15-passenger Sikorsky S-50 twin-engine helicopter. National Airlines has stepped in with an option for the first commercial delivery. Los Angeles Airways and Swiss-Belgian National Airlines also are negotiating for the S-50.

► Trans-Caribbean Airlines is interested in buying three Vickers Viscount turboprops, says president O. Roy Clark, who visited Britain recently.

► Professor Ernst Hennel's first piston aircraft, a trussor, is ready to be built as soon as the low pressure Hirsch shaft is prepared to do work on supplying aircraft parts for USAF planes operating from Germany.

► Vickers has come up with a new advanced version of the Viscount that will expand its earlier plan for the Model 800. The new Model 802 will have a 61,000-lb. gross, 56-to 82-passenger capacity and a range up to 900 mi. Rolls-Royce Dart turboprops for the 802 are scheduled to provide a 350-mph cruising speed with a 10% fuel reduction over earlier types.

► Sikorsky Aircraft Division has won a 21 hr ground and flight test on its S-52 four-place helicopter powered by a French-built Turbomeca Artouste 7 gas turbine. Powerplant is mounted on top of fuselage at base of rear head, weighs about the same as the rear transmission and develops 560 hp for itself. A new four-blade rotor replaces the original three-blade unit.

► Sikorsky engineers have developed small hydraulic motors to drive the individual wheels of their big H-825 Marine copter for center dock handling. Unit is quickly detachable, operates from main hydraulic system driven by separate power supply.

► Highly flexible steel rotors have been developed for rate gyro devices used in cargo drop or missile recovery. Rotors are rolled in spoolwise direction into 15-in diameter cylinders to save space, and mounted in frame from center strength.

► New graphic display for showing aircraft traffic flow, aimed at eliminating off-course flight patterns created by air traffic controllers, has been selected as the Air Transport Association's 1964 award. It also eliminated the idea, held by the Institute of the Aerospace Sciences' recent convention, that it will be submitted to an Consulting Committee for further study, emphasis that plan is not an official ATA proposal. New display technique involves use of a feel-back matrix instead of present moving block, which some observers feel is an obstacle to its adoption.

► Chance Vought's new Navy day fighter will be designated the F-8U, according to H. M. Hansen, chairman of the board of the newly reorganized Chance Vought Aircraft, Inc. This is the carrier-based fighter with a variable-surface wing with which Vought won a Navy competition last summer when it was still a division of United Aircraft Corp.

► United Officers' Aviation Committee are scheduled to return to regular service as the immediate future. Incapacitation of the Coast Guard over the last four years has forced many promising leads out. Possibility of an explosion in the fuselage fuel tank has been ruled out as a possible cause of the Coast Guard near Galveston. The fuselage cell type fuel tank was converted intact from the Calcutta wreckage.

► Douglas engineer Charles Wren, chief of gimballed design, recently received the 1964 WPAF report (Dec. 19, p. 13) that Douglas' F/A-18 was the first fighter version of the DC-10 transport but has not yet made a decision to build a prototype.

► McDonnell Douglas (FBI) ING all-weather, canard-based interceptor carries a high percentage of its fuel internally. Armament consists of 20 canards and externally stored refuels. Douglas has an all-allowable "kill" tail for control at the high Mach number of its operational speed range.



For complete information, write Standard Precision Steel Co., Jacksonville 3, Fla.

AIRCRAFT PRODUCTS DIVISION **SPS**
JACKSONVILLE, FLORIDA

AF Cuts J65s to Buy F-100s

USAF has shifted procurement funds from a aircraft powered by the Wright J65 turbine to buy a fighter-bomber version of the supersonic North American F-100 Super Sabre. Considerations involved:

- **Mitsubishi 8,474 "Cobras."** Total of 33 of these aircraft were cut from the schedule.
- **Republic F-4H Thunderchief fighter-bomber.** Several hundred of these aircraft were canceled from production schedules for General Motors Jack Northrop. Cutbacks dual purpose.
- **Wright J65 turboprop aircraft.** Cut from the program. The canceled B-57 and F-84E Curtis-Wright Engine Division and its successor, Ryan, will split the J65 backlog.

Selections of a fighter-bomber ver-

sion of the F-100 Super Sabre, powered by a Pratt & Whitney J57 turbojet, confirmed as earlier report in AVIATION WEEK (Sept. 7, p. 1D) last, USAF was considering this switch.

- **GM Photonics-USA** says GM's Kansas City plant will be phased out of J-65 production in the fall of 1955 at originally planned.
- **No employment changes** are contemplated at the General Motors plant as a result of the procurement switch. USAF is studying possible double-otc production plan for the program after it completes the F-54J.

There is no change in the quantity of F-84Fs scheduled to be produced at Republic Aviation's Farmington, N. Y., plant.

Deliveries in December were 124 total to 100 safety and executive planes at \$2,600,000, compared with 247 aircraft at \$2,510,000, during November.

CAA Weighs Godfrey Version of Takeoff

Civil Aeronautics Administration's investigations in the Arthur Godfrey case (AVIATION WEEK, Feb. 3, p. 13) were being prepared in New York last week by S. W. Schindel, attorney for Bagley 1, following Godfrey's waiver of a Civil Aeronautics Board hearing.

CAA may obtain more detailed evidence for the Board because Godfrey has filed an answer to the original complaint that he brought the Timbrels, St. J., airport town in "conflict" operation of his DC-3. CAA has called for suspension of the radio and television station's pilot certificates.

• **Sale Threat.**—Godfrey wrote CAB he did not conform to the traffic pattern to be followed on a flight to Miami, Fla., last June 20, and threatened to demand to be the only rule to do it.

He explained: "Upon being cleared for takeoff by the tower, I was with a right-left throttle, full left aileron and full right rudder; (opponents) (Bagley) had not advanced more than 30° before the ship yawed bodily to the left, forcing him to use the right brake to straighten out the ship.

From that point, advancing both throttles, full left aileron and full right rudder, respondent proceeded further down the runway to a point where TAS was 60 to 65 mph, when another very strong gust would have caused the ship to yaw again, this time to the left.

• **December Collision.**—At the same time, Bagley was flying his aircraft the day before (when) at 164 the rate of 50 to 50-deg angle to the left.

Respondent held the nose down so when a single engine sped up quickly as possible. Had choice of ramming into base open obstruction, which would have caused him to lose eight of them, or to ram towards them in order to keep them in sight. Godfrey had to believe the latter cause. He only thought at the time was to avoid a collision.

Having claimed all obstructions, he said, a number of reasons would have caused him to turn into the corner, even if pilot to avoid or make a sharp left turn which would keep the ship within the boundaries of the airfield.

The TV extension shall be decided on for later, he believed his aircraft to avoid a collision by turning to the right at low altitude and at a low speed under given conditions "is sound." He told CAB he repeats it because necessary to fit a pattern after this proceeded.

seventy of the corner for the industry," the court concludes, "not the effect of a policy on carriers in general."

Both opinions were written by Justice William C. Douglas.

ANDB Holds First Policy-Level Meeting

Aviation Development Board has held its first organizational meeting since the creation of a separate organization to plan federal aerospace work. The meeting was held at the National War College, Washington, D. C., Jan. 15, p. 2D.

The new ANDB chairman is Donald Quayle, Assistant Secretary of Defense for Research and Development. Other members: Robert Marston, Undersecretary of Commerce for Transportation; James Davis, special assistant on research and development to the Undersecretary of the Army; James J. Smith, Assistant Secretary of the Navy for Air; Trevor Cawson, special assistant for research and development to the Secretary of the Air Force.

Alvarez Hines Rendell, executive secretary of the Coordinating Committee on Defense, Office of the Assistant Secretary of Defense for Research and Development; W. B. Lee, Civil Aeronautics Administrator; and W. P. Conferante, chief of the Chief Staff Office of the Army; Vice Adm. R. A. Christie, Deputy Chief of Naval Operations for Materiel; Gen. D. N. Tamm, director of research and development, USAF.

3,788 Lightplanes Shipped

Lightplane shipments during 1954 totaled 3,788 aircraft valued at \$34,450,000. Aircraft Industries Asia reports

the number of aircraft in the world that have been delivered will have taken over 100,000 aircraft into the market every year to avoid or make a sharp left turn which would keep the ship within the boundaries of the airfield.

The TV extension shall be decided on for later, he believed his aircraft to avoid a collision by turning to the right at low altitude and at a low speed under given conditions "is sound." He told CAB he repeats it because necessary to fit a pattern after this proceeded.

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AIR INDUSTRY will be invited to use tunnels beneath the Avco facility, now being built.

New Tunnels Open to Industry

By Robert Rose

The aircraft industry will be offered an opportunity next year to generate perspective research in the area super-sonic aircraft development, now controlled by National Advisory Committee for Aeronautics under the winter plan.

Dr. Hugh L. Dryden, NACA Director, told AVIATION WEEK that these perspective research facilities (covering speeds up to Mach 5) would begin to be available for industry use about the middle of 1955. He said NACA and Defense Department are finalizing a policy plan for these use is available for both military and private research.

• **Upstate Research.**—The new NACA research and test super-sonic facility, now being built by the Air Force at Arnold Engineering Development Center, Tullahoma, Tenn., as the successor of the original \$2 billion center, is expected to provide adequate super-sonic aircraft for industry use in 1955 and missile development.

The NACA facilities include:

• **Lafayette Laboratory.**—A missile test facility comprising a wind-tunnel complex driven by \$10,000 hp in supply air for two 4-by-4-ft. supersonic test sections. One free flight model would cover a speed range from Mach 1.5 to 2.8 while the other loop would range from Mach 2.5 to 5. A valving arrangement in the forward section can divert air from one section to the other.

The lower speed section of the missile tunnel will be completed this summer at a cost of \$1,000,000, according to Gen. George C. Gridley. The higher speed section is scheduled to be available May 1955.

• **Avco Laboratory, Calif.**—These super-sonic facilities will be provided free use in the economic range and over covering supersonic range. They will be devoted primarily to aircraft research. The Avco facility will use a single solid propellant compressor driven by 200,000 hp to generate two tunnel loops.

The original Avco plan was completed in 1948 as a joint military-industry group headed by Arthur Barnes, vice president of Douglas Aircraft. It recognized the high cost of supersonic research facilities could make it nearly impossible for them to be financed by private industry. The plan called for government financing of the research facilities and making them available to private contractors.

Avco policy always has provided for

the use of its facilities by private industry for non-military work, but the heavy pressure of military priorities has made it impossible to affect any permit time on non-military projects during the past 10 years.

• **Ford's Tunnels.**—The original 52-ft-dia tunnel plan was subsequently scaled down to about half by another NACA special committee on aerospace facilities headed by Dr. Jerome C. Heyman.

This plan included 36 staff tunnels with 20,000 cu. ft. total volume to be built at an average cost of \$100,000 each. The super-sonic tunnel, now NACA's super-sonic facility, the USAF development facility (now under construction) at Toluca and creation of a new NACA super-sonic research center. This program again is not funded by the joint Research and Development Board of the Defense Department to a \$600-million total.

When the winter plan finally was submitted as a legislative proposal to Congress in 1948, a total outlays of \$235 million was opposed for the total leasing projects.

• **\$10 million for aircraft research.**—This portion of the program has been approved, but not because the research would be able to build these tunnels using simpler government equipment.

• **\$40 million for aircraft research.**—This portion of the program has been modified to the program's new under construction, and the plan for a special super-sonic research center has been abandoned due to its high cost.

• **\$7 million for a Navy tunnel.**—This also has been abandoned.

• **\$100 million for the USAF's Engineering Development Center.**

Of this program, \$75 million for the NACA tunnel now under construction and \$175 million for the AEDC at Toluca have been appropriated.

P&W Work Force Hits 35,000 Goal

Pratt and Whitney Aircraft employees have reached the company's goal of 35,000, and even this fall the engine power produced during 1953 will be 50% greater than in the mid-1950s, when 100,000 aircraft were produced in the mid-1950s. Other engines included J45 turboprop, T34 turboprop, R-4360 and the R-2800 piston powerplants.

During the last year, P&W's increased its employment total to a average of 300 each month. In June 1950, the firm's employees totaled 15,141. Present plant represents an increase of 130%.

Pratt and Whitney is in a position to reduce manufacturing costs by cutting inventories.

Air Industry Leaders Optimistic

UAC predicts continuing strong demand for military aircraft, while **TWA** forecasts new aerospace buildup.

Two top aviation industry leaders predict a continuing strong demand for military aircraft and major expansion of aircraft services by 1985.

• **H. M. Bunting**, president of United Aircraft Corp., says a 20% rate of attrition and modernization of the 40,000 military aircraft called for by **President** **Reagan** (Aviation Week Jan. 25, p. 15) would require replacement at 1,000 planes a year. This rates 55 billion in new business annually, he notes.

• **Ralph S. Dawson**, Trans World Airlines president, reports air transportation has not expanded yet to meet demand to potential demand, which may be long-term anticipated but will be exceeded.

Both men spoke last week as New York's **Industry Week** of the National Federation of Financial Analysts.

► **Importance of Quality**—Of the **Trans** **air's** 40,000-plate program, **Dawson** observes: "Now that does not, and should not, mean that every design and manufacturing outfit is guaranteed a living. Because of the overriding importance of quality, those companies developing the top performance aircraft should be the best and, conversely, those which do not develop top-performance aircraft should not get orders."

"If there are some that fail to do well, it's too bad, but that is our system



Lindbergh Attends IAS Honors Night Dinner

Recently photographed, Charles A. Lindbergh (top right) and his wife, Anne, former left, are shown at the Institute of the Aerospace Sciences' second annual Honors Night dinner in New York. Guests seated by rows of tables include: **W. E. Williams**, chairman of the aerospace engineering faculty at the University of Southern California; **Dr. Edward Warner**, former **Administrator** of the National Aeronautics and Space Administration; **Dr. Robert L. C. Cooper**, USAF, Deputy Chief of Staff, Development, **U.S. Air Force**; **Dr. George W. Jones**, director of the **Bureau of the Budget**, **U.S. Government**; **Model**, which was presented to Lindbergh at the **inaugural dinner**, and **Leigh**.

► **Copier Expansion**—The **Sikorsky** Division is considered a very favorable basis in view of the \$85- to \$30 billion expansion program now underway in building a second plant for helicopter production.

In addition, public transportation, **Housner** says, "the helicopter market is showing extremely strong growth in the next 20 years." In fact, a commercial expansion of the recently assassinated **U.S. 93** might spur something amounting up to the next dozen aircraft (Aviation Week Jan. 25, p. 15). In fact, that \$36 billion might be the DC-1 of vertical lift aircraft.

► **Aerospace Expansion**—TWA's **Dawson** sees 30% of all domestic airline passengers are by coach.

The airline president expects "that within three to five years the market will show 30-50% of its passenger revenues is derived from coach, as compared to the other class services. By the end of the decade, the total dollar revenues will be more than double."

"Below that time, what we now call air freight service will even change its name and become standard class with the present **Freightliner** category labeled heavy service."

► **Electro** of Springfield, **Mass.**, estimates for 1985 a 70% increase in passenger sales, 7% in revenue, yielding a 3% decrease in average revenue per passenger, expense per available seat mile approximately the same, and a payload factor of about 55%.

"These figures add up to nearly

the same operating ratios as during 1983, for a 10% increase gross bottom line, a major element of strength, even though the operating margin is by no means outstanding, as that non-cash charge to expense will be about an additional \$200 million, a most important cushion should business be less than I expect to see."

► **Consolidation**—In a move of the transformation of TWA from a long and weak airline to a profitable and younger property during the past 10 years, **Dawson** lists some of the measures taken to effect the corrective adjustment:

• Substantial capital expenditure program amounting to \$305 million and separated by the addition of 46 Lockheed Constellations and 52 Martin planes.

• Major new general facilities in Chicago, Los Angeles, New York, and St. Louis.

• Sale at a profit of the fleet of DC-3s and present Boeing Stratoliners.

Moreover, the sales organization was elevated to "bigger status," enlarging the effects of the whole organization to assist the promotion of sales in the major expansion participation-institutional marketing, service to the passenger, ex-

pances of sales outlets and integration of advertising media.

Further, the airline's chief 1985 concentrated efforts were directed toward improving employee morale throughout the company. An employee pension plan was initiated. Active management skills were utilized. Active management skills were utilized. Personnel merit among reward and rewarded.

► **Outlook Future**—Dawson says TWA's outlook, this year, is clouded by a dispute in civil compensation received in its trans-Atlantic route. The airline has a temporary rate capitated to around \$1 million a year, but believes it is entitled to a permanent rate giving a \$10 million annually. He spoke before the Supreme Court's two mid-year decisions, which he expects to be decided by June 15.

Without regard to the road pay settlement, TWA expects domestic, international, revenue to increase 10% over 1982, with a 19% boost in passenger miles.

As long as lower operating cost trends within the industry, Trans World hopes to gain 8% more passengers out of its 1975 fleet but keep direct costs at last year's level. Overhead is expected to hold close to the 1975 total.

Airpower Contracts

The following firms are among those whose high military contract volume includes work in the aviation field. Like those published earlier (Aviation Week Jan. 25, p. 15), these are included in the Defense Department's recent list of the 100 top U.S. defense contractors.

Rating	Firm	Value of contracts (billions of military dollars)	% of total military contracts
22	Boeing Co. of America	564.7	9.7
36	E. I. du Pont de Nemours & Co.	538.4	9.5
34	Fairchild Tex. & Rubber Co.	424.6	9.4
40	Phelps Corp.	318.8	5.4
41	Collins Radio Co.	312.2	5.3
42	Raytheon Mfg. Co.	311.6	5.3
45	U. S. Rubber Co.	284.8	5.1
49	Standard Oil Co. (N. J.)	235.5	4.3
53	U. S. Steel Corp.	224.2	4.2
59	Standard Oil Co. (Cali.)	209.2	3.7
60	American Bosch Corp.	187.4	3.2
61	General Dynamics Corp.	159.0	3.0
72	Minneapolis-Honeywell Co.	137.7	2.2
74	Schulman-Kline Products, Inc.	149.5	3.2
80	E. F. Gindrich Co.	337.2	0.1
89	Lang-Water Corp.	133.3	0.1
90	Stearns Oil Corp.	123.3	0.1
96	American Machine & Foundry Co.	115.7	0.1

Titanium Plans

• **Curtiss-Wright** proposes 6,000-ton-a-year plant.

• **Industry** continues effort to increase production.

Curtiss-Wright Corp. is seeking Air Force assistance to develop a 6,000-ton-a-year titanium fabrication facility at its Buffalo, N. Y., plant during the next two and a half years.

The proposal was disclosed by the firm's board chairman, Ray T. Harney, at a session of the Senate Subcommittee on Strategic Minerals and Materials. The project would be used for Curtiss-Wright's currently programmed strategic engine requirements.

The proposal is pending before the Senate Select Committee on Small Business, headed by Sen. George McGovern, D-S.D. The facility would be developed gradually, with establishment of a pilot plant at the first step.

► **Cost Pattern**—"I am an engineer," **Lindbergh** says, "so not for the basic metal I need to do my job." **Hawley** told the subcommittee, "and in a sense it looks as though some I am a little out of character in doing that. But I think that is the thing to do. . . . There is no question about the economics of it, even at today's costs. The metal will pay for itself."

Hawley has estimated that if titanium were made available, his company would use 15,000 tons annually by 1990 as commercial and military markets.

McGovern predicts that titanium, with an average cost of \$15 a pound and a metal cost of \$13 a pound, will follow the same cost pattern as other metals. McGovern says, he points out, was introduced from 55 a pound to \$16.60 over a five-year period in the 1970s, and the same target has dropped during the past four years from \$16.60 to \$13.45 a pound to 15 cents a pound.

► **Devalued Effect**—The Curtiss-Wright move is one of several developments in a determined effort by government and industry to increase titanium production sharply (Aviation Week Dec. 7, p. 14; Dec. 23, p. 22, Oct. 26, p. 14). Other developments: • **General Services Administration** announced an agreement under which E. I. du Pont de Nemours Co. would increase its target capacity by 5,000 tons a year. • The world would have the total production capacity of 15,000 tons by 1995 to 21,000 tons.

The firm would spend approximately \$600 million of its own funds on studies and drawings. If these were successful, du Pont would construct a plant, probably in Tennessee, costing from \$100 to \$150 million. If these were not successful, the government would reimburse the company for its cost.

• **Arthur S. Fleischman**, director of the Office of Defense Mobilization, has announced that a subcommittee to draw up a five-year program of titanium usage expansion—headed by Robert H. Kellogg of the Columbia University School of Engineering—would start working immediately.

Against Secretary of Defense **Elmo R. P. Winter**, in charge of the Bureau of Materials, is the second number. A third will be appointed soon. Gen. **McGregor** and Col. **Jameson** Meek, commanding officer of Army's Watervliet, N.Y., arsenal, are serving as consultants.

• **Assistant Secretary of Defense for Supply** and **Assistant Secretary of Defense for Acquisition** **W. Thomas**, reported a survey to establish "baseline" defense requirements for titanium will be completed in about two months.

Two years ago a requirement of 35,000 tons of sheet a year was set by Defense Department. This was reduced to 22,000 by OSDM, and then increased to 25,000 by OSDM. It has been estimated that the military services alone could use 150,000 tons annually.

► **Devalued Effect**—The Curtiss-Wright proposal, CISA now has the ability to contract for capacity beyond the 12,000-ton goal, almost certainly with the use of post-appraisal.

The companies **Electro Met. Co.**, a subsidiary of **Union Carbide** and **Gulf Corp.**; **Dow Chemical Co.**; **Westvaco**; **Pyrostream Corp.**; **Boronics, Inc.**; **Manasco Chemical Co.**; and **National Research Corp.**, which have jointly developed a process



FIRST PRODUCTION Twin-Beech ready to buyers from less 169,990 plus tax



LATEST BONANZA with four and sells for \$16,990 or 110,990, depending on engine

Beech Unveils 1954 Plane Stable

Beech Aircraft Corp. dealers and distributors have taken a preview look at the new "Super 18" Twin Beech, which incorporates a number of engineering changes aimed at extending the life of the Model 18 business plane series, during a million-dollar "Float-a-Rama" in Wichita, Kan.

At the conclusion of the drawing, orders showed from dealers for 15 of the new planes, up to 180 mph, for approximately \$11,990, and an additional 34 and 160 in contracts for 1954 single-engine Beech and Twin Beech.

Five features of the new Super 18, officially known as the E18B, are as reported in *Aero. News*, page 566, 3/25.

■ **Increased Performance**—Important improvements in performance as a result of the many changes are noted by Beech, particularly increased cruising speed to 175 mph and range to 1,450 miles. Top speed is 214 mph.

The gross weight of the plane has been increased 500 lb. to a total of 9,300 lb. Empty weight with standard fuel and average weight with auxiliary fuel and average miles equipment is 6,150 lb.

The engines, two Pratt & Whitney Aircraft R-985-AN-4-60s that deliver 450 horsepower at 2,300 rpm, have been fitted with exhaust augmentor stacks. Hamilton Standard propellers have middle blades.

■ **Larger Wings**—Extremely one of the most noticeable changes from previous Model 18 are the spans wings. Wings have additional area and span. This change has boosted the plane's single-engine rate-of-climb and single engine ceiling.

Landing and takeoff characteristics are improved, the company says, by lengthening the tailwheel strut and raising the level of the fuselage, giving the pilot added visibility while taking.

■ **Deeper Fuselage**—The fuselage has been made deeper, providing approximately four inches more head room in the cabin. Number of windows in each side of the cabin have been increased from three to four, and each window has been depressed four inches—improving passenger visibility.

An important new feature is the incorporation of a recessed step that can be lowered to provide easy exit and entry without need for a separate ladder. The side of the door has been enlarged.

Other features include an 80-gallon tank that standard equipment (previously optional) separate compartment in the nose for radio equipment and a new, corrosion-type locker for the cables, including radio flight and as an optional feature for electronic equipment.

■ **New Twin Beech**—Second of the two business planes Beech is offering that year is the new 559 Twin-Beech, of which more than 100 will be delivered in 1954, with possible going to approximately 180 buyers who placed firm orders for the plane early in 1951.

These have been delivered and now most still have the plant floor finish. Price is \$99,990. Wichita

■ **180 Changes**—New soon on the 180 design and equipment changes mark the new 180 Twin-Beech.

The machines, powered by 260 hp

Lemco GGD-435 GDs, has a cruising speed of 192 mph at 10,000 ft. at full gross load of 6,000 lb., 500 lb. heavier than the earlier version.

Cruising range has been increased 100 mi. for a minimum of 1,000 mi. with six passengers and baggage. Rate of climb is 1,930 fpm., and street ceiling is 20,000 ft.

Among the changes and equipment changes are additional rear cabin windows on each side, new combination-type 50,000-lb. heater, which also has the optional engine-driven fan available on the E18B selection of winglets, and fitting of a non-illuminated air light (500 cands).

■ **1954 Bonanza**—The new low-wing E15 Bonanza, with the distinctive V-tail, this year is being offered with a choice of two engines: E185-11 Continental of 165 hp. which has been the standard powerplant on previous models or the E175-8 Continental of 225 hp.

Top speed with the former is 190 mph.

Price of the 203 hp. E15 is \$11,990. The 225 hp. version is \$11,200 higher.

ACC Asks Comments On Production Study

As Coordinating Committee has asked for comments from the aircraft manufacturing industry on the production aspects related to its policy study (AVIATION Week Jan. 4, p. 12).

Deadline for the written comments is Feb. 10, but individuals who wish to make personal presentation can do so later by special arrangement with ACC. The following topics will be covered:

■ **Research and development**
■ **Procurement policy**, including maintenance of production base, distribution of procurement funds, withdrawal of facilities via selected companies, subcontracting policies, secondary sources, administrative and contracting policies on aircraft procurement, development of standard qualification plan and contractual framework prior to emerging long-term contract planning, time limits as appropriate and maximum use, availability of production contracts, audit arrangements, allocation of government contract rights, and cost financing under procurement contracts, government research, standard facilities, including source plants and outside fiscal reserve.

■ **Business requirements**, including: powerplant selection between carburetor and fuel-injection, and strategic materials availability.

■ **Other means of support for industry**, including production and sale of civil aircraft and components, and export sale of military aircraft and equipment.

■ **Security factors**, including disposal of aircraft manufacturing facilities.



technical bulletin

a New

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2. Speed of stroke
3. Spread between jacks
4. Operating load
5. Mounting dimensions



Another new product from the design department of EMCO is this pilot seat adjustment actuator that can be made to your exact specifications in almost every dimension. The weight of only 7 pounds, of two hydraulic jacks, a total weight of 200 pounds and more. The maximum spread of these very EMCO jacks is 25" x 46" x 64". In short, containing the seat, a very EMCO motor for driving the two jacks, as well as the clutch, brake, limit lever switches and valve filter. The two jacks are coupled for synchronous and simultaneous movement. The actuator (illustrated) has the following specifications:

Operating load: 250 pounds
Voltage required: 25 DC. Amps: 1.5
Stroke: 4.635". Speed of stroke: 70" per second
Ultimate static load: 6000 pounds
Ultimate static compression load: 1200 pounds

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Lear strubjacks form but one part of a comprehensive line of Lear electro-mechanical actuating products for aircraft use. Their unique design, light weight, high strength, and precise operation spell out the reasons for the use of Lear electro-mechanical products on almost every commercial and military aircraft flying today. Let us discuss your electro-mechanical problems. We will either have the answer on hand or be able to develop them quickly.



LEAR MODEL 510 STRUBJACK (shown above) Combines with three other units to complete a positive, nonreciprocating engine cowl flap control system for the Convair 340. The entire assembly is actuated by a constant power source through a Lear system of flexible shafting, which can be utilized to transmit power to additional accessories.

DR

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TAL Aims for Scheduled Service

Nonstop reports it could buy equipment, begin flights across both oceans one week after CAB approval.

Transocean Air Lines has completed financing arrangements to buy aircraft equipment for short-haul scheduled passenger and cargo services across the Pacific, and from Atlanta to theights of God. Aviation Board approves the two routes.

"We could start daily service across both oceans in a week, if deserved warranted," Transocean president Orval Nichols declares. "All we need are CAB clearance."

► \$5.5 Million Profit—Nichols' disclosure of the financing arrangement follows a report that the parent company made a net gain of more than \$3.2 million during the past year. Total operating loss of more than \$100,000 total profit reflected at \$100,000 after taxes were reported for company subdivisions.

Book value of company stock increased from the equivalent of \$4.85 per share during the year to \$7.75.

The net gain is shown on an auditor's statement for the year ended last May 31. A supplementary report says increased business and consolidation has improved the company's position since that time.

► Husky Airlines—Nichols says his company is in healthy condition, "getting better every year with 2 or 3% of our growth per year," he says.

Transocean subdivisions had their best year in 1953, he reports. They all did nicely, and now are almost entirely self-sufficient, requiring little attention from the parent company.

Nichols notes that the subdivisions have done a good job in carrying the

parent company through the ups and downs of continued operation. It has been forced to conduct in the seven year fight for CAB certification.

As a means to an end, the company's diversification has made the operation big enough so that it can recycle equipment, a necessity in a business that must take what is at hand when it is needed. It has made TAL largely self-sufficient, able to service and maintain its equipment economically.

"If you're not a complete idiot, you can't exceed your costs," Nichols says.

It has allowed Transocean to hold together its "house here." The company was big enough, for example, so that when the subsidiary Aerostar Engineering & Maintenance Co.'s business dropped to nothing between the Berlin and Korean airfields—with only half a dozen remaining on its official payroll—TAL was able to switch some 150 lay employees into other parts of the organization.

► Cost-saving—Effort—TAL's operating loss, Nichols explains, was to considerable degree the result of the company's continuing effort to get CAB certification, which required it to maintain facilities and conduct tests in the Atlanta and Tampa areas so that the airline will be in a position to operate if and when a transoceanic service is awarded.

Transocean has kept up its base at Bradley Field, Conn., base station at Conley, New Bedford, and Swanson, Iceland, and offices in Franklin, Georgia and Rome.

► Money Makers—Biggest money makers



Chinese Nationalist Tests New Copter

This tandem-seat, two-blade, all-metal aircraft was designed and built by C. I. Chen, a major general in the Chinese Nationalist air force. It started its in-dive test program in Taiwan, Formosa. Designated the CH-3, it is powered by a 199 hp Lycoming, has a design top speed of 92 mph and

seated climb of 696 fpm. Construction is steel tubing, sand-cast iron. Rotor diameter is 25 ft. and gross weight is 2,000 lb. Maj. Gen. Chen's sister CH-1 and CH-2 aircraft were similar types built on the Chinese mainland prior to evacuation. He was graduated from MIT in 1936.



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among the subcontracts won the Texas-based Engineering Corp., construction firm that made a profit after costs of more than \$100,000, and Aratua, which is getting under way on a \$3-million contract. The performance and speed of 30-31 hours—first in the set of 10 to be awarded to a company other than the incumbents.

Aerospace is working on 29 of the 180 add'l tractors to be headed. When work reaches full scale, the suborbital roll have 190 planes on the maintenance line at a time.

► **Airlift.** Operations-Flight took the parent company in handling exclusively a three-month contract for 90 roundtrip flights in the Korea conflict, won when TAI, but low under the Air Materiel Command's new policy of awarding contracts in open competition.

Transocean was a partner in the airline that flew down some 165 passengers to the quake zone, about 21% of the total for commercial operations.

The company is especially proud of its aircraft vibration figures for the eight averaging 11.7 hours each.

"We're getting vibration for beyond our foodstuffs," Nelson says, "and with fewer and fewer of us substantiating work per flying hour. We get 30% more vibration now than we did in 1950—and with half the number of aircraft. And our planes are as fatigue-resistant as they're built, and that practically doesn't happen."

► **Fight.** Comsat's TAI, which has started on a contract with the International Council for Economic Magnitude for transport of 792 migrants from Tempox class to the New York



Checkup

Dr. Melvin A. Cobberg (left), Assistant Secretary for Defense, Health and Medical, and Dr. John C. Clegg, Director of Lockheed PMSG, aeronautics division, during a recent visit to Wright Air Development Center, Dayton, Ohio. The visit to WADC was part of a tour of USAF, Navy and Army centers during which Cobberg gathered first-hand information on military activities.



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► **A:** You're right if you say vibration control. But there's more to it than just that. Each has answered a special vibration problem encountered in the aviation industry.

► **1** **Isolating engine** from vibrations. MIL Regs. Month from a 25-year record of continuous service. Newest all-directional design, shown weighs 287 lbs as against 49 lbs of former type.

► **2** **Airborne noise control system**, was enabled to function properly when vibration and noise problems was experienced by the MR designating.

► **3** **To protect instruments and equipment**, this "AN" type isolator was designed with multi-directional vibration absorption.

► **4** **Used with "canard" engine**, this special engine mount protects against vibration and shock in flight.

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Both use improved, longer-life regulator—adaptable to similarly rated J&H inverters now in the field.

High-altitude, 250-va model available soon.

Now in production at Jack & Heintz are two new inverters (motor-generators) approved for 50,000-foot operation. Model F137 delivers 2500 va at 50,000 feet and +30°C ambient temperature. Model F147 is rated at 1500 va under the same conditions. Both models use 115-volt, 400-cycle, single-phase rotary units (3-phase units are now undergoing qualification tests).

Improved electrical insulation, redesigned commutator and brush arrangements, new housing configuration for better air flow, and the new FBS speed and voltage regulator assembly represent the major advances effecting this high-altitude inverter performance.

A smaller but no less important inverter for 50,000-foot operation is slated for early production. Designated as J&H Model F17-1, it is a 250-va unit actually capable of operating up to 65,000 feet with some de-rating.

Our engineers will be glad to work with you in developing inverters or other Rotomotive equipment to meet your specialized needs. Write Jack & Heintz, Inc., 17655 Broadway, Cleveland 1, Ohio.

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even between Jan. 1 and Mar. 31.

This contract followed completion of one test flight in June, during December test flying approximately 7,000 military degrees in 26 flights between the New York area and Birobchin, Kogard, and Frankfurt, Germany.

JAL also has a contract to serve the test territory of Pacific Airlines and make weekly flights to spinal centers in the Mariana and the Marshall, plus emergency flights as needed. Plans are under way to acquire the fleet of PIAA presently used with Canadian Airlines, according to JAL.

The airline is flying Douglas DC-8 freight service to Birobchin from Oshkosh, and between Horns Lake and Guayaquil. JAL reports it carries 10% of the passengers flying in and out of Horns Lake, making about 50% of the trips. P-Globe Progress International management a new airline service in Afghanistan last December providing weekly flights between Kidal and Cava, a distance of 2,500 mi. At Jerez, with which the U.S. has had a management agreement, is conducting the open

test, using DC-9 transports.

JAL is providing pilots and the packers for Japan Air Lines, scheduled to begin Tokaido-Hanwa service this month, as well as assistance for the Japanese Aircraft Maintenance Co. which will handle JAL maintenance in Japan.

Under a technical training program, the airline is providing flight instructors to train Japanese crews and expects to have all JAL co-pilots on domestic runs by June 1. The company also expects to complete a maintenance training program for Japanese mechanics by July.

JAL has a small interest in Japan, but does not expect to expand its operations for purchase of more stock when capitalization is increased at the next board.

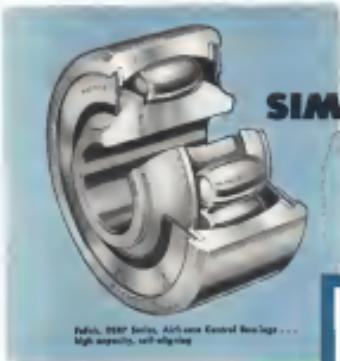
A flight operation based at Fargo, N. D., is engaged at this date in that area and is on its third year of a contract with the State Department for aircraft control in 10 countries in the Middle East. The contract calls for operating of selected aircraft along with



Closeups of New Agricultural Plane

Introducing details of new Central-Louisian Air Trainer sprayer plane, are revealed in these new photos of craft which recently began its flight test program (Aviation Week Jan. 18, p. 7). Top picture shows how sprayer bars together behind pilot with low nosewheel extending to tail. The lower bar is used to permit easy cleaning of spray bars after use of corrosive farm chemicals.

Next large end plates on wingspan. Closeup view of Air Trainer shows instruments mounted centrally in gall portion of upper wings at joint point; rear view shows tail section with the ground and obstacles while flying low. Powered by a 400hp PIMA Wasp Jr., the plane can carry a load as much as 2,000 lb. Central-Louisian Corp. is located in Yutan, Wis.



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Two major additions to the Pafair Line of Aircraft Bearings feature design simplifications for improving control systems on high speed aircraft. The DBRP Series offers not only the greater capacity for its weight and size, but also the simplest, free-float construction. The KP-BB Series is a means of cutting down on space and weight, but of greatly simplifying bearing installation with a resilient bearing design for quiet and noise.

These far-reaching advantages are typical of the results gained by Pafair's continuous research, experimentation and collaboration with aircraft design engineers. They add a determination to say "on the ball", to keep in step with aircraft progress. That explains why Pafair continues to get and to deserve "Innovation's job" as it relay... and why Pafair is the largest supplier of bearings to the industry. The Pafair Bearing Company, New Britain, Conn.

Every new achievement seems to a "take-off" for still another Pafair advance.

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DBRP-B
Aircraft Ballistic
Ball Guide, Guide-ball
Series

DBRP-B
Pilot Seats or
Aircraft Bearings

110
NASC Aircraft
Pilot Bearing Seats

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training of astronauts in flight control techniques.

► DC-10 Project—One of the accomplishments of TAL's maintenance department last year was the construction "from the ground up" of a fire-extinguisher plane, the equivalent of a DC-10.

The project involved the design of TAL's maintenance base that a half and center wing section of a Douglas trans port was in storage in Tucson, Arizona. These parts were brought back to San Francisco headquarters and assembled with factory parts to complete the plane.

Only two months after the base parts were received the new aircraft

passed its flight test, and federal certification followed shortly thereafter. It is now in service on the Ronco shuttle.

► The Future—"There are so many ways to explain opportunities in aviation that we don't worry about the future being uncertain," Nease says. "We've got a lot of experience in flying and a lot of experience in getting business, and we know that the people with the deepest pockets will survive."

He notes that the company had been devoting special attention to sharpening its pencils in the last year. It has upgraded its accounting department management, flight and control and put almost all of its procedures

under IBM control. It is including maintenance control in the system.

Transports may go into Astroflight cargo flights on a selective basis for corporate customers. Nease says, offering equipment, crew and maintenance on a "pay as you go" basis.

There is a big unexploited field in corporate charter flying, he suggests, not only for movement of sales and management forces, but for the use of planes in "flying display rooms."

Construction

- Committee gives nod to \$156 million AF projects.
- Defense Command Gets \$25.6 million for radar.

An AF contract has been given approval by House Appropriations Committee to move forward with \$156 million in new construction.

This year's Defense Appropriation Act requires committee clearance on 40 military construction clearance bills.

► Naval Radar Request—The major new USAF radar projects are: Air Defense Command, \$15.6 million for radar test network; Military Air Transport Service, \$16 million for Dover AFM; Research and Development Command, \$10 million for Arnold Engineering Development Center; Strategic Air Command, \$10 million for Little Rock AFM, Ark.

The committee turned down all of Navy's requests for jet engine test cells because:

"There is a major discrepancy between the present Navy and AFM test cell component."

It is the desire of the committee that study be made of the jet test needs of the Navy and the AFM with a view toward development of a standard test cell."

► The Projects—Here are USAF projects approved:

• Air Defense Command: \$1,507,000—Bergenfield Municipal Airport, N.J., \$120,000; Duluth Municipal Airport, Minn., \$121,000; Corpus Christi, Tex., \$110,000; Fort AFM, \$121,000; Greater Pittsburgh Airport, Pa., \$120,000; Randolph AFM, Calif., \$121,000; Tucson AFM, Ariz., \$106,000; MacDill AFM, Wash., \$37,000; McChord AFM, Wash., \$37,000; Minneapolis-St. Paul Airport, Minn., \$181,000; New Bedford Municipal AFM, \$181,000; Newark Penn Municipal Airport, N.Y., \$107,000; O'Hare International Airport, Ill., \$173,000; Oregon AFM, Calif., \$126,000; Puerto Field, Wash., \$181,000; Portland International Airport, Ore., \$165,000; Sacramento AFM, Calif., \$120,000; Seattle AFM, Wash., \$100,000; Tulsa Municipal Airport, Okla., \$120,000; Tucson County AFM, Ariz., \$125,000.

• Alaska Air Command: \$1,000,000

• Far East AFM: \$242,300

• Radar net: \$25,514,000

• Air Defense Command: \$1,404,000—Barksdale AFM, Ark., \$125,000; Wright-Patterson AFM, Ohio, \$1,667,000

• Air Forces Command: \$17,782,000—Edwards AFM, Calif., \$1,100,000; Right AFM, Calif., \$1,611,000

• Air Training Command: \$17,000,000—Barksdale AFM, Tex., \$1,100,000; Davis-Monthan AFM, Ariz., \$1,100,000; MacDill AFM, Fla., \$1,100,000; McChord AFM, Wash., \$1,100,000; Wright-Patterson AFM, Ohio, \$1,100,000; Wright-Patterson AFM, Ohio, \$1,100,000

• Air Force Systems Command: \$1,100,000—Barksdale AFM, Tex., \$1,100,000

• AFM, Tex., \$1,100,000

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caused to increase load factor on certain fleet. Complaints of "Bygeman's" routes where business is low the first few months of the year. The ruling has applied to Civil Aeronautics Board but the new tariff to expire Apr. 1. Should the experiment prove successful, Davis says his company will voluntarily apply for an extension of the time limit.

Protestant appeal 13 DG is underway in North Carolina, South Carolina, Virginia, Kentucky, Tennessee, West Virginia and Ohio. The new rates are in effect only between the cities of Charlotte, Fayetteville, Winston-Salem, Greensboro, Durham, Winston-Salem, Raleigh, New Bern,

Wilson, N. C., and Newport News, Richmond and Norfolk, Va.

CAB May Speed Up Nonsub Investigation

A speedup of the pasted or carrier investigation is indicated by a new Civil Aeronautics Board order suspending any further extension of the case to either of public interest, convenience and necessity.

Individual applicants who have not been heard will be given an opportunity of "The carrier feasible time," the Board has ruled. But all public interest

questions are to be decided before the Board will hear further evidence of the qualifications of individual applicants in the investigation.

¶ 30 To the Board—CAB's order defers further hearing or acceptance of additional evidence relating to an applicant's clientele, mode of operation, evolution and other qualification aspects inasmuch as time.

The pasted investigation has been continuing since September 1951. General presentations relating to public interest questions were made at the beginning of the hearing by 25 "interested and interested persons."

Individuals on 30 different applicants have been heard as of "These are 30

¶ 31 Minority Challenged—CAB members John Lee and Joseph T. Adams have dissented, claiming separation of the "general public interest question from the issues regarding qualifications and selection of carriers will assist substantially expeditious disposition of the pro hearings."

"On the contrary," Lee and Adams contend, "the present action of the majority of Board members will actually require additional time for final decisions to be reached within the majority finds that these are no other major regular air carriers in air transport service in this country, other than the applicants on the ground that such carriers are not required. Only if this result is reached by the majority will the procedure be expedited."

If the Board finds there is a place for regular service on air transports, the dissenters say, it will be necessary for the remaining 30 applicants in the case to present their viewpoints, not only with respect to the question of fitness and safety but also with respect to the public interest issue as well.

With the attendant procedure, it will be necessary to extend the hearing "for at least a year," Lee and Adams claim.

¶ 32 Time Factor—Cited—The majority argues that "experience in their mode of operation and other aspects of fitness, willingness and ability has been heard with respect to a sufficient number of the applicants in present to the Board a representative cross section of the regular air carrier industry applicants as needed to determine the public interest questions related to the air transportation rate, if any, to be assigned the regular air carriers."

Without changing the procedure in the case, Lee and Adams say, the Board will cause a substantial savings of time and the age of a large part of the earlier record may already "waste its value and considerable re-hearing may be needed," the majority of the Board has decided.

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AMS 6389	Bar	8240	Annealed Round
AMS QO-5-615	Shape	4130	Annealed Normalized

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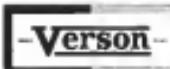
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MIL-S-5005A	Sheet	Type 302	16 in. In and Full Hard Temper
MIL-S-5006	Bar	Type 303	ED Finish
MIL-S-5006	Sheet	Type 303	Round, Square, Flat, Annealed or Pickled
MIL-S-7780	Bar	Type 303	Round, Square, Heat
AMS 5812	Sheet	Type 303	ED Finish
AMS 5812	Sheet	Type 310	ED Finish
AMS 5812	Sheet	Type 310	ED Finish
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AERONAUTICAL ENGINEERING

Australians Revamp F-86 to Take Avons

- Commonwealth version of Sabre has 60% new fuselage to take bigger engine, heavier guns.

(McGraw-Hill World News)

Melbourne-Australia's version of the F-86 Sabre, built by Commonwealth Aircraft Corp. Pty. Ltd., is otherwise very little different from the F-86 produced in the U.S. by North American Aviation, Inc.

But substitution of the higher thrust Rolls-Royce Avon for the General Electric J47 and as the U.S. jet, and the replacement of the 20-mm. machine guns by canons of heavier caliber, have required so many structural changes that only about 40% of the original fuselage structure has been retained.

►**Inside Modifications.**—As the larger Avon engine consumes some 25% more air than the smaller J47 counterpart, it was necessary to increase the size of the intake duct correspondingly.

This appeared to present serious difficulties at first, but a simple solution was achieved. The front fuselage is split horizontally and a wedge of resin-impregnated material is inserted in the split, thus dropping the lower lip of the fuselage some 30 in. at the front.

In order to utilize as much of the original structure as possible in this change, extension joints are let into the sides of most of the fuselage frames so that the weight of the new—slightly more massive—intake duct is carried by a corresponding amount in order to preserve the original length of fuselage.

►**Cooling and Venting.**—The Avon engine brought many problems of cooling and venting, as well as the more physical problems of severe and instillation. Thus from the nose fairing to the fuselage break point, an entirely new structure (besides the original fuselage) was required. Moreover, a gantry assembly from the engine was required, as provisions had to be made for either cleaning, liquid, or lubrication storage. This took all the room within the engine case housing which was occupied, in the case of the J47, by the hydraulic pump and generator.

In order to live the Avon engine completely supported within the forward portion of the fuselage, it was necessary to move the fuselage break



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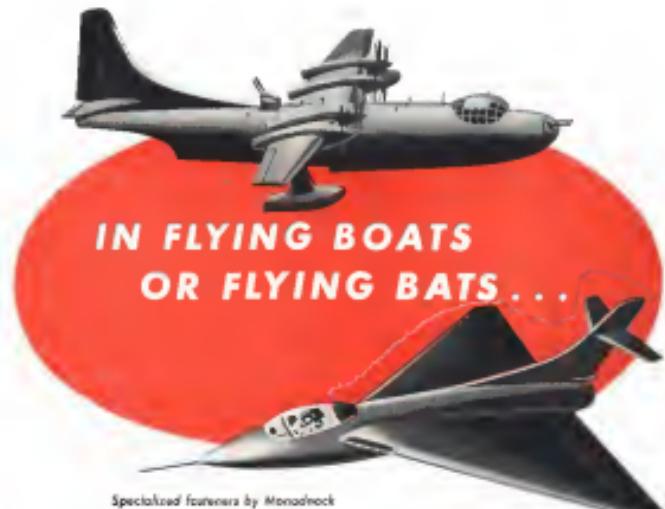


U. S. SABRE, which is powered by GE J47. Australian F-86 has R.R. Avon engine.

joint rearward to the new location of the cowl fairing trailing edge. Thus the front portion of the fuselage is almost 28 in. long, and the forward fuselage lengthened by a corresponding amount in order to preserve the original length of fuselage.

►**Forward of Firewall.**—In the nose fairing of the fuselage, there is no great source of heat at this portion of the engine as comparatively cool. However, it is necessary to cool the nose to remove all fuel and oil heat that might accumulate to form an explosive or combustible mixture. Thus all heat loss from fuel pumps and lines have been fed overhead and the nose is insulated as flight by small NACA-type ducts carried in the outer skin, leaving a slot opening on the top center line.

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— Keynote of AVIATION WEEK's "Inventory of Airpower"

traditional Armaments of surface forces both on land and sea. The new Airpower Doctrine of U. S. Defense recognizes that true Airpower is composed not only of Military Aviation but also of Civil Aviation elements such as the Airlines, Business Flying Fleets and the Manufacturing and Overhaul facilities of Private Industry. This new Airpower Doctrine was developed by the Defense Department late in 1953 and was approved recently by the National Security Council and President Eisenhower. It will be the blueprint for the development of Military and Civil Aviation during the next three years. The 21st Annual Inventory of Airpower issue of AVIATION WEEK will be keynote by an analysis of the new Airpower Doctrine and its effects on all of the special phases of the Aircraft Industry by AVIATION WEEK's expert staff and documented by official fiscal figures and specification charts.

Inasmuch as the 21st Annual Inventory issue will be a record one in terms of Industry usefulness, Military and Government reference, all companies Manufacturing for or serving the Aviation Industry are urged to be represented in this edition.

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cost of the engine and tubes.

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structure and access to these units. It served as an assembly jig for the first set of hydraulic, fuel and air lines, and electrical cables. Each line was balanced to fit and placed in its correct position, and as the rig was open, having no skin, young men were able to work unobstructedly.

In this way, all pipes and cables for the prototype were assembled long before the Freilege structure was ready to receive them, and the usual difficulties and snags of prototype equipment installation were overcome while the structure was still being fabricated.

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IAS 22nd Annual Meeting Reports:

Biggest Attendance, Most Papers

New high was established by the Institute of Acoustics at its 22nd annual meeting at New York last month. The five-day session, which runs from Jan. 25-29, saw the following:

- A greater number of papers presented than ever before at an annual meeting of the Institute.
- More technical sessions, covering a greater number of astronomical topics than have been the subject of previous meetings.

- A larger attendance than ever before, which gave the Institute a new high mark.

Content emphasis was placed on aerodynamics, acoustics, electronics, and radioelectronics aircraft. Other sessions included structures, meteorology, aircraft engineering education, aircraft design, materials, light, flight safety, as transport, flight propulsion, and rocket propulsion.

Participating organizations included the American Helicopter Society, Institute of Radio Engineers, Institute of Navigation, Radio Technical Committee on Aeronautics, American Metronautical Society, American Society for

Engineering Education, Society of Acoustics, American Physical Society, Darmstadt Institute of Aerodynamics, Aviation Control at Cornell University, and American Rocket Society.

AVIATION WEEK presents here summaries of papers delivered at the various technical sessions. Because of the length of this material, it will be necessary to present it in installments, of which this is the first.

Aeroelasticity

■ A Theoretical Investigation of the Oscillating Control Surface Frequency Response Technique of Flight Flutter Testing. R. P. Peppings, Chief Dynamics Engineer, Boeing Co.

A theoretical background is presented for a frequency response technique of flight flutter testing using harmonic deflection of a control surface in the constant Mach number. A graphical method is outlined for determining system flutter stability from mean and steady-state data. The method is compared with the more commonly used frequency response technique. Computer results for a specific flutter system are presented to exemplify the method of data interpretation.

It is shown that, without complicating the analysis by assuming the structure to have only a single degree of freedom, the frequency response technique can be used to obtain flutter frequencies in terms of quantities that can be directly measured. As an example, a similarity expression for the probable value of the equivalent spring rates of a panel subjected to flutter loading is derived.

■ The Story of Shamus. W. F. Marshall, Chief, Mechanics Research Branch, Aerodynamic Research Laboratory, WADC, Wright-Patterson Air Force Base.

A theory of landing gear shamus is de-

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Westinghouse Air Arm Division Looks for 'Tough' Avionics Jobs

By Philip Klass

Baltimore. A visit to the new multi-million dollar plant which Westinghouse Electric Corp. has built near Friendship Airport to house its Air Arm Division, and conversations with officials who run the operation, reinforce that Westinghouse intends to maintain, and hopes to expand, its recently won role as one of the nation's major producers of avionics for combat equipment.

Basic Air control stations, developed and produced here, will control the Navy's newest jet interceptors to track down enemy bombers, day or night, and are being built in new British interceptors. Av. Air officials say huge interest in the Air Force for combat market, markedly dominated by Hughes Aircraft Co.

The Air Arm Division has also developed, and is producing, airborne-type defensive armament in the form of a cable-controlled gun turret for a new Navy attack bomber. Westinghouse engineers, whether Av. Air products are used on USAF's Lockheed F-104C and -D, or for later models of the Republic F-105.

Recent Expansion.—Cooperated with competitor Ray Sperry and Reader, Westinghouse is a giant player in the avionics field. Despite this, Westinghouse has chosen to reveal no specific facts, including

*First radar combat kill. Navy Doug

in F-104, equipped with Westinghouse gun control and fire control.

Westinghouse, as in Korea, is credited with first in intercept radar kill in combat (Aviation Week Feb. 9, 1955, p. 15).

*First production fire control intercept WSA intercept, and on the F-104, is called first production-type equipment designed to minimize intercept radar fire position as accomplished with signal from Hughes' mini-computer.

*Mag amplifiers planned. Westinghouse may be the first in the country to develop a rugged magnetic amplifier to replace vacuum tubes in primary equipment.

*Change in Policy. The Av. Air Div., formed about two years ago, represents an expansion of assets that will add to Westinghouse's avionics interests under one roof, and an expansion of these activities. At such, it is a sharp departure from the company's pre-World War II policy.

Put to the test, Westinghouse's sales in the industry increased largely at steady annual rate of 15 percent, advanced primarily by sales to foreign markets, strategic and tactical aircraft, missiles, communications, and computers. When, in case, the company's resources prove and other non-military business will continue to produce combat-type military items. The company found it self manufacturing a strange assortment of items, some foreign to its aircraft line, some designed by other com-

panies which had been engaged in production activity were, and to the war.

Like many others, Westinghouse had its problems in adjusting the design, design and production techniques of other companies to a manufacturing or government acquisition to its own long established procedures and techniques, according to Frank W. Godley, Jr., manager of Westinghouse's several Baltimore facilities. Products include Av. Air, Electronics, and X-Ray, the latter two located separately from Av. Air Arm.

Lessons Learned.—This wartime experience has had a marked influence on the company's present move to set up private sector engineering and manufacturing facilities devoted to military avionics work. "At the outset of war, Av. Air can find designs, know how and work to our civilian product plants, and we are up to do it specially," Godley says. But these were after factors behind the formation of the Av. Air division.

The more complex weapons systems require companies with considerable breadth, including finance, facilities and know-how. "Codacy points out Westinghouse has such breadth and from a corporate responsibility is able to such difficult defense assignments," he points out.

Military Business Attraction.—Westinghouse management also considers military business attractive, despite its relatively low profit return on sales. Codacy says. Reason is that the company gets more emphasis in percentage return on assets than return on dollar sales, he says. "With accountable management," Codacy expects Av. Air to prove a financially attractive partner to the company's usual industrial and consumer business.

In 1954, Av. Air expects to ship \$70,510,000 worth of products



WESTINGHOUSE'S NEW AIR ARM PLANT is located adjacent to Baltimore's Friendship Airport, facilitating flight testing. Blimp carries out crop or by-pass strip.



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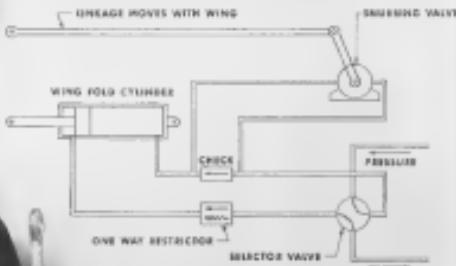
8. STACKED TDFIDS are interconnected as required by means of printed circuit strip wrapped around the assembly and then dip soldered to the terminals.



9. IMPREGNATION makes possible not only a safe but impervious to heat coating. Westinghouse says special impregnant helps rug amplifier dissipate heat.



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Flow vs. handle travel at 60 psi maximum pressure drop shows how new Parker shear-plate valves provide fast snubbing at each end of the plane travel.



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"Parker's shear-plate valves are also intriguing in design," he continues, "because they can provide the best snubbing available. This results in the result of returning at each end of the plane travel . . . made possible by the nose-dump shape of the ports."

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plant, Westinghouse forced out production of its W-3A autopilot for the F-94C and early models of its Navy fire control systems to other divisions of the company. Rather than transfer these products elsewhere, the company decided to move its production of those older designs to the new plant to ensure Only new designs, new enough into production for the first time, are being manufactured at the new Air Arm plant.

► **Comparison With Hughes**—In contrast to Westinghouse and Hughes Aircraft both produce fire control equipment, it is natural to compare their factories. An observer quickly notes two marked differences. The Air Arm plant has comparatively less permanent equipment, with less practically none of the statics or inactive production lines found at Hughes.

While Hughes has a large number of temporary fixtures, more or less, the Westinghouse plant uses 12 fixed machine fixtures, except for seven metal stand and welders, according to R. K. McDevitt, manager of manufacturing. Major reason for that is the different design approaches which Westinghouse and Hughes have used in their fire control computers.

Although both computers are analog types, Westinghouse prefers to use potentiometers, using two-hour

potentiometers, Hughes uses mainly a mechanical-type calendar (an event system), which can fit passes gear, differently and longer.

► **Different Philosophies**—The absence of automation-type production lines at the Air Arm plant is due to different engineering philosophies. Westinghouse does not think it justified to move the ability to produce for a relatively low production equipment.

One spokesman expressed overall Air Arm philosophy this way: "We think the Air Arm manufacturing plant should be geared to small quantity production runs expected from present military, missile and fire control products as well as new equipment needed in time of war. Heavy production runs should be passed on to other (Westinghouse) plants set up to handle mass-producing on short scale."

Westinghouse is proud of its modern plating rooms, which can turn out 67 different types of plating. Hughes has had exhaust hoods for fumes have been replaced by a sole and undersink ducting system. A quality-control lab in one corner of the plating room is used to check samples of the plating solution at regular intervals.

At Air Arm has helped develop a new technique for leading cable assemblies which greatly reduces vibration costs. The bending technique involves the use of claim made the wire-grip.

Design Philosophy

The basic engineering philosophy at Air Arm, as expressed by Dr. Donald, is to achieve the state of fire control art by modest and reasonably safe steps, rather than risk a bold venture which carries much greater risk of failure. This doesn't mean that Westinghouse is reluctant to explore radically new approaches. However, Donald feels these should be investigated independently and that the nation's defense should not be committed to an approach that seems to be the best.

If the Westinghouse approach is more conservative than that of Hughes Aircraft, it reflects the fact that the Navy, its principal fire control customer, has a more conservative defense program than Hughes. It was also reflected the fact that Westinghouse is an old-line company. Hughes is brand new.

► **Plant Man**—Donald feels that industry should "plant" lots of development "seeds," recognizing that many won't mature or prove out. Intent with enough, Westinghouse thinks that the major companies should do more development with their own funds. Air Arm's policy is to chart a logical course of development, and with the funds whenever possible, fill the gaps with its own money.

For example, Westinghouse con-



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cluded that there was a need for a new type of equipment for high-speed day fighters. With its own funds, Air Arm developed such a unit and is now at the point of interest to the military services.

► Getting More Out—Hensel thinks that present radar for coastal air may be far from approaching the point of diminishing returns. He believes that more effort should be devoted to improving the military's ability to get more of the potentially available performance out of their equipment.

For example, Hensel believes that for coastal equipment, what could be made central for the operator to use, even if it is good. In developing its newest system, Air Arm relied in psychologists, consulted with Baker and Naval Research Lab engineers. The result, Hensel says, is a big improvement over the predecessor equipment, but there's still room for improvement, he adds.

Hensel can see advantages for the military in all the noted equipment manufacturers (both Navy and USAF) concentrating the manufacturing parts of their equipment, such as陀螺仪 manufacturers, some years ago, as standardised as possible.

► Greater Reliability—Greater equipment reliability is another way of getting more out of the existing state of the art. One Westinghouse approach to this objective is the wide use of vacuum amplifiers in its autopilot, com-

puter, and radar servo systems. Major new studies for radar are also under development to replace hydrogen fluoride tubes.

Hensel points out that the only basic limitation to the wider use of vacuum amplifiers is their comparatively low frequency response. This can be improved by the development of better vacuum materials and for the use of a higher or a single frequency. Westinghouse is exploring both avenues.

As a company, Westinghouse is heavily committed to magnetic amplifiers, and is doing much basic research on these materials. Company has spent a million dollars on mag amp manufacturing facilities, much of it at Air Arm.

The other approach under study at Air Arm is the use of magnetic frequency converters to raise the basic input frequency (400 cps) by a factor of three or more. At this rate, amplifiers are operated at 1,200 to 2,000 cps, a frequency high performance noise tolerance.

► Mag Amp-Electrode Combustion—The attractive features of ionization and mag amplifiers have led Westinghouse, like others, to use both in combination for experimental noise amplifiers.

Air Arm, however, is wary of using ionization in production equipment until more reliable units are available. Meanwhile, the division is experimenting with ionization in a variety of radio and servo circuits.

► Another Approach—For those current wave tubes are required, Air Arm uses metal frame wave guides, corrugated wave tubes, and tubes with segmented wave and corrugated air plates for ruggedness. Air Arm problems there are 66 different potted circuits, in 16 different wave units, for use in its radar, computers, and autopilot approach chapter.

With use of these plug-in units permits compact chassis layout and eliminates the familiar "rat's nest" of exposed chassis wiring and components. Even more important, a single-line trouble shooting and repair. The fault need only be to one of the 16 waveguide defective units, which can quickly be replaced. Defective units are dissolved under insulation prevents internal repair.

► Major Contribution—Westinghouse has made a significant contribution both to radar maintenance and to improved reliability with a new single-package for control systems. All of the many components, except for the cockpit indicator and amplifier, are fitted in a frame so they conform to the contours of an interceptor's nose cone. The complete system package can be quickly removed or replaced as a unit, individual components in the package are also easy to replace.

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single package construction, one has to look at the F-94C fighter aircraft, with some 35 "black boxes" scattered around the nose section. However, the Hughes is made of an earlier design than the new. Westinghouse package. It is possible that newer Hughes sections now under design will come in single package-type construction.

► **Other Advantages**—The single-package construction permits Westinghouse to fabricate and form practically all of the interconnecting wiring between system components, simplifying the overall installation for the aircraft manufacturer.

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Another advantage of the packaged construction is that a single cleared and test system can save all of the black boxes in the package, with the added benefit of cooling air for each act according to its internal heat dissipation. That is a more efficient arrangement than the more common practice of putting individual cooling fans in each box.

From a logistics standpoint, the new Westinghouse packaged system is particularly attractive in the Navy. Except for cockpit accessories, the same test equipment package can be used on all of the Navy's new crop of interceptors.

► **From Test**—Westinghouse has made it easy for a pilot, radar operator, or

maintenance man to spot-check an air force aircraft system. Engagement can be obtained by setting up a test problem (using special logic circuitry), pulsing a button, and then watching the radar scope. An Air Arm believes strongly in built-in test provisions, wherever feasible.

External test equipment for field use is also required and Air Arm has set up a separate group whose prime function is to get such equipment designed and not on time. The group handles test equipment design for all Air Arm products.

Westinghouse says it has been developing equipment extraction techniques in advance of the equipment itself. It's very desirable, but not two-deep practice in the industry.

Another maintenance aid is an elapsed time meter which keeps a running tabulation of the number of hours the fire control is operated. This permits establishing maintenance and over haul periods based on experience and, instead of on the last significant air plane hours.

► **Engineering Staff**—Air Arm engineers (including departmental totals) exceed 1,300, of whom approximately 500 are graduate engineers. In addition, 194 are university students. The largest engineering function, involving model plane and flight engineering. Many of the Air Arm test pilots are also engineers, an important requirement when testing complex equipment in a single place environment.

The Air Arm engineering staff is effectively larger than its numbers would indicate. This should amaze many because it is the division drawn on engineering talents in other company divisions,



Small Actuator

Lightweight actuator, weighing under 1 lb., developed by Minneapolis-Honeywell's Aeromechanical Division for aircraft use, consists of two-phase 400cps induction motor, variable-speed generator, and 50:1 gear train. Over 90% of new model MG710A is used at 1 in. lb. for continuous duty, 1 1/2 in. lb. under stalled condition. It measures 2 1/8 in. dia. and 5 in. long. M-H says actuator meets all appropriate MIL and AN speci-

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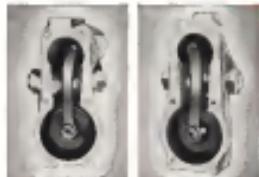


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panies from sending representatives. Sender says it is offering the service as a service to industry. Exchanges will be accepted until mid Feb. 79.

► **World's Tallest Ruler**—Wards for G. M. Gossen & Co. to announce a powered ruler, possibly the world's tallest—at least the size of the Iron Curtain. Now they will be hermetically sealed in glass, will be available in certain single-joint versions open at naturally closed points. Gossen will be located in East Orange, N.J.

► **MH Test For Control Couplers**—Massachusetts-Honeywell says it has developed and successfully tested an interrogator for control unit couplers for its autopilot which enables an interrogator's valve-computer to measure the plane automatically into flying position. The test plane is believed to have been a Northrop F-5B, which uses the MH 451 autopilot. For its original design studies, MH purchased about 100,000 of existing computers to enable it to conduct simultaneous three-year simulations.

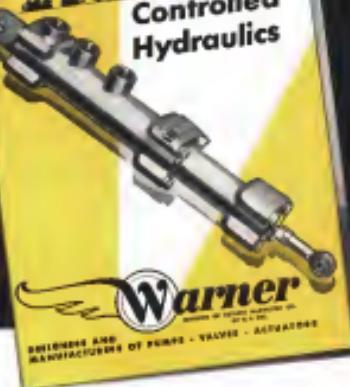
► **New Maintenance Diagrams**—Two aerospace equipment manufacturers have signed license agreements with International Telephone & Telegraph Co. to manufacture its newly developed Maintenance (periodic-circuit) maintenance components and plumbing, following IT&T's licensing of the technology (Aviation Week Nov. 30, '78). A company spokesman reports a third firm is ready to sign. The two licensees are Cal W. Sherrill Mfg. Co., Lindenwood, Ill., N.Y., and Diamond Mfg. Corp., Mass.

► **ANB's Power Brake Valve**—Evaluation of the British E. E. Cole "Sportman's GCA" (AVIATION Week Dec. 6, 1972) by the Maran Corp. under Air Transport Association Board sponsorship, showed it to be inadequate for heating during flight in aircraft or helicopters, as ANB spokesman says. Tests showed that it was too difficult for operators to keep the valve system aligned on the approaching aircraft and that the use of indicating lights and an A scope (instead of a PPI) did not provide the operator with sufficient information to assess the aircraft's position. These positive shortcomings were cited in the Aviation Week article.

► **No Go on Mag Amplifiers**—Collegiate Radio has abandoned its attempt to come up with an autopilot which uses magnetic switches throughout and instead uses a few vacuum tubes in the production version. Company is currently demonstrating autopilot, installed in a Twin Beech, to airlines to get their comments. —PK

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EQUIPMENT



AA Reports on DC-7 'Teething' Troubles

Problems uncovered in first two months of operation have been minor, carrier says; pilots like the plane.

By George L. Christian

American Airlines is well pleased with its new, spindly Douglas DC-7s after the first two months of scheduled operation. "Teething" problems have been relatively minor.

American reports its pilots are saying that the plane "has beautiful control characteristics," and maintenance personnel maintain that the DC-7 is fully trouble-free, considering the numerous changes and modifications the transport undergoes.

The carrier has purchased 25 DC-7s, 12 long-haul and 13 medium-range versions of the plane. Commercial service was inaugurated on Nov. 29, 1957. The airline naturally has taken delivery of one DC-7, expects to have the whole fleet by April of this year. Late last month, American increased its New York-Los Angeles schedule to two round-trip flights daily in each direction.

American's Wright and AA officials to find out how the aircraft was behaving during its initial phase of commercial operation.

Frank Tolle, in a frank discussion of pros and cons of the first two months of DC-7 operation, American officials concluded that the airline was having trouble keeping it to its 7.55 hr. weight schedule.

In an equally candid manner, AA engineers pointed out the many and varied faults of the aircraft equipment and components. Particular emphasis

was placed on their return new to the DC-7, which did not meet on any of the preceding "DC" family.

Specialists Santa-American is adopting a four-pronged program to fix the last nags out of its 7s, to meet its stipulations eight-hour windshield out-stop time limit, and to eliminate the fact that the 7s have to fly some 2,000 ft. under the 25,000-ft. cruising altitude originally planned, because of power drop when the plane's Turbo Compound engines are forced to cruise fuel consumption (Aviation Week Dec. 28, 1955, p. 11).

• Better ground operating procedures. American is working on ways of cutting the time required to turn the plane from blocks to taxiway.

• Better aircraft operating procedures. The carrier is concentrating on precision navigation, equipped with the best possible weather forecasts, no allow pilots to fly optimum flight paths—the route of the shortest time regardless of distance. Autopilot will help too.

• Aerodynamically slanted aircraft. AA is looking over its 7s with an eye to cleaning up every possible part of the plane to reduce drag as much as possible. Examples are better sealing of gaps between leading edge of the wings and ailerons and flaps, possible use of

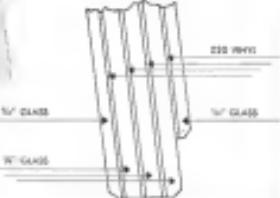
airfoils in centering the aircraft.

• Avionics instruments. The DC-7 is the first aircraft Douglas plans (and probably the only) to implement a new transport concept for the Boeing Stratocruiser which does away entirely with the vacuum system. All gauges are electrically driven. And since the flying surfaces are therewith designed, there is no need for a vacuum pump. The alternating current system itself is working very well, according to AA electrical engineers, although some

How big areas of curved Multiplate are used in the windshields of the Douglas AD-5



A report from
THE PITTSBURGH
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Designs of the Douglas AD-5 "Skyraider," called for a divided windshield of curved bullet-resisting glass more than one inch thick. The accompanying diagram and photograph show how Pittsburgh Multiplate Glass was engineered to this job.

The Multiplate used in this windshield consists of five plates of glass with vinyl filters between. In the cross section above, the inside and outside plates are 1/8" and the three interior plates are 1/4". Vinyl filters are 1/8", giving an overall thickness at this point of 1 1/4" + 1/8" = 1 1/2".

Each windshield contains 608.31 square inches of Multiplate. The glass is curved to a 42° radius and has a "depth of bend" of 18".

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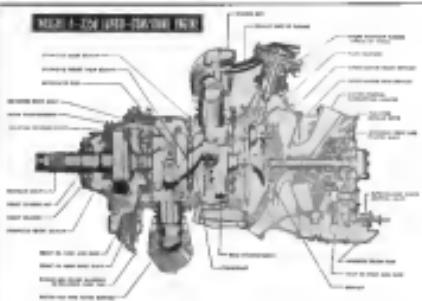


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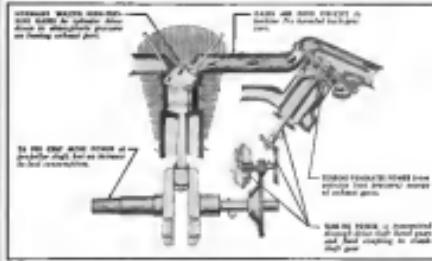
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trouble of a temporary nature has been experienced with the Edgerton-Pioneer aerial hoists.

From the air conditioning system, Anderson reports that, so far, it is not able to compete with its Fugro cab roof cooling system, because most operation has been during cold, wintry weather. The system, which was installed by AA and Douglas to the vendor's DC-7C, functioned well on the ground. As with all new equipment, further trials are being conducted and finally full results will be known when the system is put to the test during the owner's hot weather operation.

Powerplants



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pace of the turbine got at least one stuck in a cowl fire. Force of the turbine blades split the weld in the cowl's tailpipe.

AA engineers said that the failure probably would not have occurred had the lack of lubrication affected No. 2 tail pipe. Being at 7 o'clock, gravity would probably have allowed oil to fall to flow to the bearing to provide adequate lubrication. This could not happen to No. 1 turbine when positioned at 5 o'clock.

► **Snub Box Checks**—American says it is experiencing trouble in the torque converter housing. The cover is a casting snugged in a torque converter housing previously designed by Wright.

The owners of local strengthening, with distributor and gaskets, of the intake section of the exhaust nozzle with the nozzle heat cutting. American does not feel that the trouble it remains and believes that it will eventually be eliminated.

► **Fuselage Problems**—AA has experienced three transverse patina lines behind Wright has already made one improvement, manufacturing the plates from a forging rather than a casting.

A later change will invert the pressure cell to prevent the possibility that either the side of which will release during cabin load, thereby problem.► **Good Power Surfaces**—On its aircraft line, American likes the Wright Turbo Compound engine. Its reputation points to the excellent power surfaces of the 3350. As its later models have given highly reliable performance in such planes as the Lockheed Constellation and Super Constellation and the Novi P-51, the 3350 has been.

The strike, which at this writing had accumulated a maximum of 350,000 miles on older "Turbosuper" and "Turbocompound" engines, was not a problem with the aircraft. But the legend of them has to be cleared off, because the 3350 are fine math and pick up "lots of metall."

The Civil Aeronautics Administration has imposed a 1,000-lb. overload panel for the aircraft, contingent on the condition of three single engines expected at the end of 300 and 900 hours of operation.

American's engineers look in the future of the Turbo Compound "with an air of optimism." They see no reason why the commercial version of the compound cannot attain the 3,200-hp rating currently approved for the maximum rating of the engine.

► **Propeller**—AA has experienced a few cases of premature separation of prop feathering surfaces. This involves nothing more serious than putting the feathering surfaces again to feather the prop completely. And the failure only

Four design ideas you can use right now...



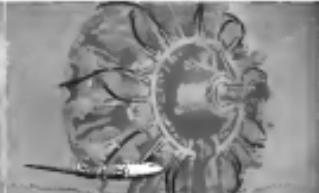
DEPENDABLE FUEL HYDRO. Fuel for the J46 Turboprop Engine is heated to the bottom through "Titeflex" flexible metal hose. Tough, light weight Titeflex—heat for temperatures from -76°F to +400°F, and for pressures up to 800 psi—reliably conveys fuel to engine nozzle, without vibration and rough wear as in flexible metal hose.



FAILURE-FREE INSTRUMENTATION. Designed primarily for instrumentation services at high altitudes, Titeflex Special Convoluted is pressure tight and resistant to moisture and corrosion. Durable and flexible, weight only 1/8 of an ounce! Special ideas, meeting AA Specification, can be made with 2 or 3 pins and all threads—lead or dielectric for easy design.



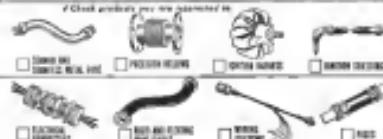
CUSTOMIZED WIRING SYSTEMS. Titeflex specializes in designing and building special "packaged" wiring systems and instrument assemblies for today's complex avionics and guided missile installations. These may be jacketed with protective sleeves or other components—and Titeflex Special Convoluted and its integral parts make complex wiring problems.



RADIO SHIELDING. Titeflex Harnes for instrumenting engines is an example. Titeflex makes a wide range of shielded flexible hoses meeting tight military specifications—can also supply component parts, such as reinforcing bands for motors and commercial aircraft. Titeflex application on Wright R-1820 Engine includes hoses and leads.

FROM DESIGN TO FINISHED PRODUCTS. Titeflex is especially well qualified to help you with all problems of special metal hose, wiring and connections. Take advantage of the long experience of Titeflex engineers in developing high temperature fuel lines, in designing and fabricating harness and wiring systems. Write us now about your application; our nearest representative will be glad to call and help you. Or send for our new 48-page Metal Hose Catalog No. 890.

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Aircraft Division
BETHESDA, MARYLAND

United Airlines Division, Wyoming, 6-1, N. S.; Eclipse Division, Farmington, L. I., N. Y.

heights at high altitude where outside temperatures are very low.

The modification has never interfered with an actual feathering operation, AA reports. Hercules Standard has come up with a fix which should prevent future premature feathering phenomena.

Instruments

As spokesman say they have experienced several premature removals of Eclipse Pioneer artificial horizon. Some of the reason they cited were pilot's and co-pilot's movements not agreeing because of shakiness, excessive vibration, and the little airplane firing because out of the glass face of the instrument. This problem can be licked, AA believes, by adding vibration dampeners. The cause seems that the basic design is "very good" and says AA has been working to prevent recurrence of the trouble.

► **Autopilot.** Marquette-American will install the Sperry A-12 autopilot plane on its first seven Douglas DC-7s. Fleetwide installation will depend to a considerable extent on how these first seven work out. The system will weigh only 100 lbs. and is designed to prevent damage to the aircraft.

Airline why the autopilots were not installed by Douglas when the planes were delivered, AA made this point: Marquette of a sensitive autopilot such as the A-12 is a high performance autopilot such as the DC-7 is a very easy place to install which cannot be overlooked with a design change.

The DC-7 will be converted in such a manner that it will not be subject to autopilot installation problems flagged behind. But AA sees the final solution in the near future. The autopilots will be equipped with automatic approach complete to simplify instrument approach.

The carrier does not see that the automatic approach control will lessen operational costs until some time in the future.

► **No Vacuum.** A major policy change involved with American bought its DC-7s the elimination of the vacuum system. All gyro instruments are electrically driven.

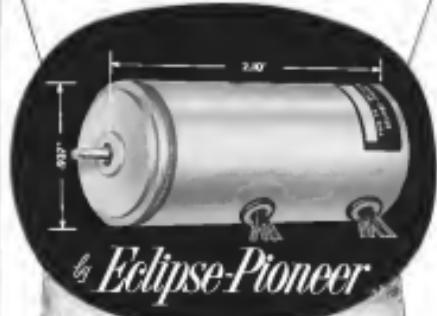
Here it is the carrier cannot adequately supply sources of ac power for its instruments. Under normal conditions, ac is supplied by two inverters, either of which can supply sufficient power for all the DC-7's ac. The plane's ac needs are only 75% of other in-service aircraft's ratings.

In case of failure of both inverters, the flight engineer can switch on a battery-powered generator. Since the battery is normally connected to the main bus, the inverter is wholly bypassed.

If this inverter fails down, the crew

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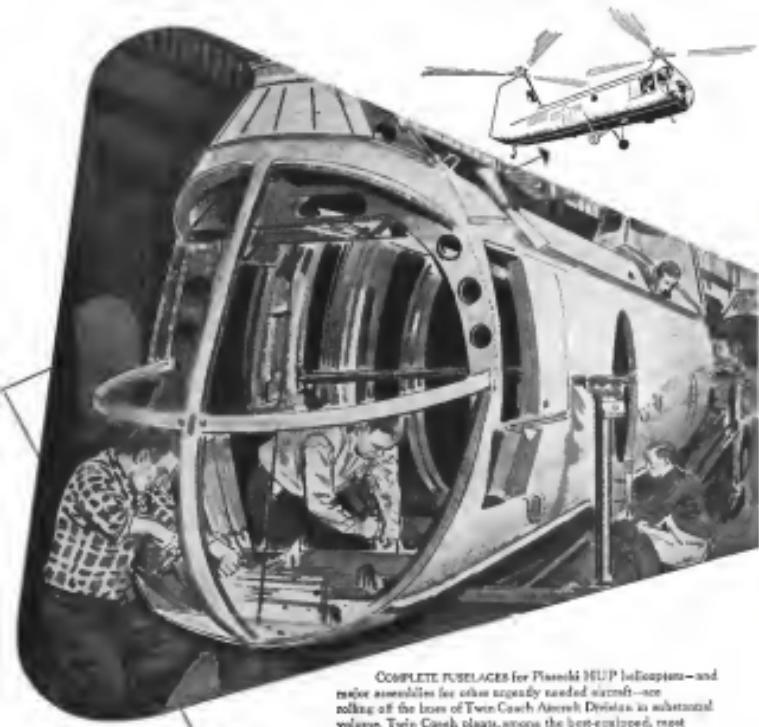
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Jascha Lubitsch, director of the Twin Coach Division, looks his last glint in the sun when he retires. But he's Technical High, folks. The last lines of the plaque he's inscribed are these:

Twins Early Birds Build Whirly Birds



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can mount to two Frise-Poison air-gate-driven actuators mounted on Nos 2 and 3 engines. The 100 cu. in. units supply air at the proper frequency for maximum operation with engine rpm ranging from 2,000 to 2,400 rpm, single rates out of any climb, cruise, landing or landing conditions of engine operation.

Equipment

The surface areas up to limited by the Frise cabin cooling equipment to date, thus far, have been tested out up to 8000 rpm. The cooling coverage produced is slightly above that indicated. Experimental—
• **Experiments.** Experimental—Conceivable improvements from a weight standpoint in the ailing Americans now give five tons of cooling for 485 lb. in equipment weight. By using new materials, it is hoped to get the five tons out at 250 lb. And with the new cooling mount given now on the horizon, it is possible that the units may put out as high as seven to nine tons for the 250 lb. in weight. So Americans is optimistic about the future of its aircraft air cooling system.

It is too early to evaluate the maintenance reliability of the Frise system. • **Goodyear.** B-52s—AA's DC-7s are equipped with Goodyear triple-blade wheels, which have excellent landing qualities according to the carrier.

It has experienced these troubles:

- The brake pads are protected against corrosion by being plated with cadmium and zinc. These metals tend to melt off under the brake's high operating temperatures. Result is that certain radial lands to chip up brake clearance, causing them to drag. Solution, according to AA, is to strip off the cadmium and zinc and go to a protective finish such as Teflonizing.

- There has been a tendency for the brake's retaining bolt to shear (retain any part of the brake) to determine which permitting attachment bolts to break. Americans say Goodyear is going to a forged bolt plate to increase its strength. Bolt size is also being increased by one.

- **Electrical and Hydraulic.** The DC-7's electrical and hydraulic systems function well, according to engineers who specialize in these systems.

The plane's Vicksen fixed displacement hydraulic pumps have been changed from 25 deg. to 10 deg. to give greater capacity.

AA say the hydraulic system on the DC-7 is basically the same as that on DC-6s, 6BPs and 7As, but the high degree of modularity of the system as demonstrated in these planes did not indicate that any major changes were necessary. AA has retained an hy-



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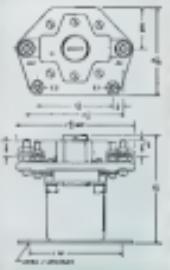


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Schematic



Dimensions



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Rating—10 amp resistive, inductive,
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double strength, and uses standard aircraft fluid in the plane's main hydraulic system. Cabin supercharger hydraulic drive system, uses Monotrol's four-position 250-lb. load.

► Speed & Range—To sum up America's opinion of the DC-7, airline spokesman say, "In the DC-7, American Airlines has a plane with the speed, range and high degree of comfort which will keep us in line in the forefront of the business of air transportation until U. S. jets are proved and ready to carry the flag public."

Swiss Introduce New Plane Instruments

A new line of Swiss aircraft instruments, designed for use in airplanes in civilian, military, executive, private flying and gliding fields, has been introduced in the United States.

Manufactured by Perma Instruments, Bern, the line includes pressure barographs with altitude scales up to 45,000 ft., accelerometers, barometers, tachographs, altimeters, aneroidographs, turn indicators and radio sounding television equipment.

One operator, by use of a Perma Metograph, found that 30% of his gliding time was spent in the air for ground and other aircraft just as distant as any altitude operation. A revised operating control mechanism resulted in substantial reductions in maneuvering rollouts, the company reports. (The Metograph is an instrument, mounted in an engine nacelle, which records manifold pressure, rpm, and pressure altitude in a fraction of



Tape Navigation Aid

Newly developed, plastic tape has been put to use as a navigation chart to prevent pilots from getting lost in the air. It is a flexible chart, easier following of a desired course line, lessening steady visibility confusion as to wind velocity, true heading, magnetic variation and the like. Navigation is written on small pieces of the tape, then placed at appropriate points on map. Manufactured by Lufthansa Tape Co., Inc., tape strips without numbering, can be applied and mapped, and can be written on with any lead pencil instruments.



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time on a 24-in. wide roll of newspaper giving coverage of 90 hr. of operation (Aviation Week, May 5, 1952, p. 56).

Metrair has participated in the test work and has been advised by a leading aircraft manufacturing firm, while others have been used by pilot carburetors, according to The Metrair Equipment Corp., 2214 South 20th Street, in the U. S.

Metrair Engineers' Agency conducted a client and pilot research program using Peacock carburetors, the firm adds.

Metrair has Peacock research and engineering facilities are available for the development of special-purpose instruments. Metrair's address: 2214 South Michigan Blvd., Chicago 4, Ill.

OFF THE LINE

Dekov Aviation Corp. has expanded environment overhead facilities to pursue complete aircraft modification and repair work on all flight instruments and engine instruments at its Fahey B-47 and B-52 jet bombers. The company says it "has all the laboratory facilities and trained technicians to provide this service as an instrument whether mechanical and permanent, electrical or electronic." Dekov has been CAA-licensed for these four instrument classifications. And the company has quality control approved from the USAF, USN and RCA!

Passenger train rig, being installed by Stinson Division of Fairchild Engine and Aircraft Corp., will speed accessory lubrication system to high speed areas. Lubrication required in such equipment since variable air is fighters are uncovering at high speeds. The machine, built by Gen. Hydraulics, will go onto Stinson's Bus Show, N. Y., April 1.

Aerospace (Columbus National Airlines) has signed a contract with Lockheed Aircraft Service, Inc., Islip, N. Y., for all maintenance and other services on two DC-3 passenger planes scheduled for service on the carrier's Guangzhou-New York run. Terms are fixed price per flight hour.

Thiokol, Inc., Newark, N. J., has opened a Metrolife office at 181 Bay St., Beck Building, 1249 Washington Blvd., Detroit 26. In charge is Edward Frank.

Oil filtration systems for aircraft engines, developed over 5,000 hr. are under development in the Aviation Products Division of Winton Engineering Co. in cooperation with engineers of several major airlines, the company announces. Aim is to secure adequate filtration without excessive weight or bulk penalties.

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readily throws out off-sizing parts.
It can also be used with a type 487
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Unit can eliminate operator dis-
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sort many thousands of parts per day
says manufacturer. Parts can be passed
through test and in a belt conveyor or
other handling means if desired.

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nal whenever of standard parts pass
through test unit. Signal can be used
to operate a solenoid operated reject
gate or other reject means.

Hydraulic Press Reduces Both Tube Ends at Once

Now double-end tube reducing hy-
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To reduce 2 in. diameter thin-walled,
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lems using a progressive reduction
as well as a single-stage reduction.

Days are counted internally on each
new stage with external automatic
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Telling the Market

Short metal fastener for pressfitting, snapfitting and crimping up to 155 staples per minute is described in catalog available from Wiles-Singer Corp., 145 Payson Ave., North Tonawanda, N. Y.

First Fifty Years is an attractive one volume history covering history of Clark Equipment Co., makers of material handling machinery, auto, wheel, transmission and numerous other devices. Write the firm at Brooklyn, N. Y.

Negative flag strips to reduce ready adhesion to technical plates at desired locations are being distributed by Sales Service Division, Eastman Kodak Co., Rochester, N. Y.

Machining of plain-blended discs is covered in 22 page booklet from Gleo Machinist Co., Another being issued by Mylres Corp., of Armonk, N. Y.

The How Book of Cost-Cutting Materials Handling is booklet including 161 cost methods for analyzing materials handling problems. Write Yale Material Handling Division, Yale & Towne Mfg. Co., Philadelphia 13, Pa.

Walking machines, more than 20 models, are described in catalog being distributed by Air Reduction Sales Co. Included are sections on accessories and illustrations. Write the firm at 60 East 43d St., New York 17, N. Y.

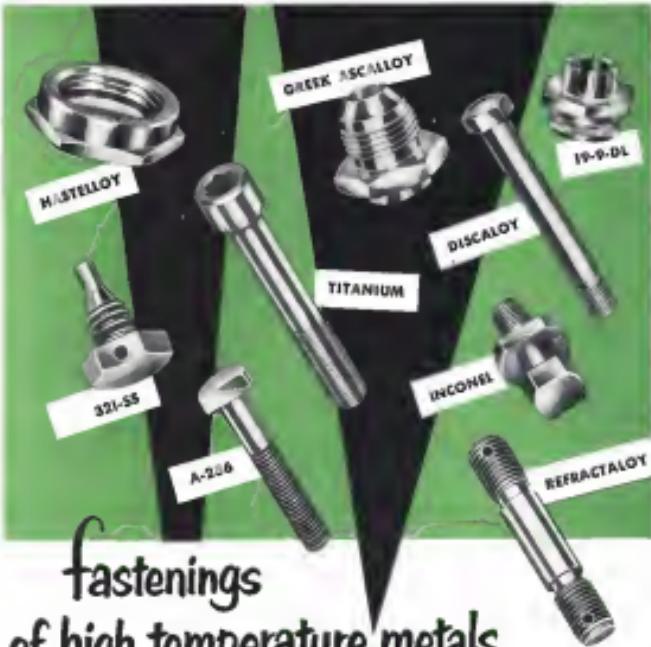
Publications Received

• The Papers of Wilmer and Orville Wright—by Morris W. McLeod—published by The McGraw-Hill Book Co., 191, 111 W. 45th St., New York, N. Y. Two volumes, \$75.00, 1,720 pages. Mr. McLeod, prompted by Charles College, has collected and arranged the Wright papers of the Wright brothers. These papers from the Library of Congress Agricultural Division, cover the experiments of 1900-1905 (Vol. I) as well as the years of aircraft construction and aviation. (Vol. II).

• Helicopter Operation and Design Requirements—by AIAA. Helicopter Requirements—by Technical Services, AIAA, Interim Technical Aviation Guide, Montreal, P. O. Box 2000, 100 10th St., 10th Floor, Montreal 1, Quebec, Canada. 100 copies \$1.00. Order from Technical Services, AIAA, 1751 K Street, N. W., Washington 25, D. C.

• The Physics of the Steampunk—by R. M. Good—published by Cambridge University Press, 32 East 57th St., New York 22, N. Y. \$5.00, 175 pages. Describes the present state of scientific research, including an account of the basic principles, major theories and experiments.

• Optimum Climbing Techniques for High Performance Aircraft—by Maurice A. Giat—published by Cornell Research Foundation, a non profit corporation, 1774 Lake St., San Francisco 11, Calif. \$1.50, 50 pp.



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CAA Backs Avgas Tax to Support Airways

- Charge would cut 20% from airlines' net profits.
- Congress to use report in framing legislation.

By Richard Balonkin

A revised measure may charge study calling for support of the \$57-million federal system through imposition of an aviation gas "golddust" tax was sent to Congress last week by Civil Aeronautics Board.

Because direct charges for use of specific airway facilities and services "do not appear to be administratively feasible and might well tend to lower the general level of usage," the study recommends only indirect charges, such as the "golddust" tax would be practical.

As proposed in the current version, the charge would cut about 20% of net profits of the three major airlines, about one-half of the plan as proposed by Congress and the Federal Aviation Agency.

► **Ten-Mile Tax.** A second indirect charge would be a gross tax rate for applicable to all aircraft of more than 4,700 lb. mission gross (billed) weight and a graduated approach fee for aircraft weighing up to 4,500 lb.

However, the study feels the "golddust" charge pattern would not be able to solve the administration problems both to the government and each of the service and would find reader acceptance.

CAA's study was prepared by chief economist Richard K. Woods and his team. Gary Thompson, communications director, and director of Joseph D. Bish, assistant administrator for programs and evaluation.

It is the result of an earlier draft submitted to Civil Aeronautics Board, Defense, State and Treasury Departments and to road transport agencies and aeronautical directly affected by the proposed plan.

► **ATA Comment.** The earlier study caused some concern from Air Transport Association when released in October (AVIATION Week Nov. 7, 1955, p. 78). ATA attacked the basic reasoning of the proposed methods and logic of CAA.

The committee agrees directly with the plan as it stands and administrator simplicity, the study reports. Reasoning is that "the amount of fuel consumed in an aircraft is proportional to its weight, power and distance traveled

Airways Tax Revenues

Estimated receipts from charges to be imposed on domestic civil aviation services in fiscal 1955:

User group	Estimated gross receipts (\$ millions) (\$ billions)	Estimated receipts (\$ millions) (\$ billions)	
		At 15 cents per gallon	At 21 cents per gallon
Scheduled air carriers	110	\$12,750	\$17,800
Other civil	140	3,420	4,260
Total	1,810	\$16,170	\$22,060

Estimated receipts from various gross ton-mile charges imposed on aircraft of more than 4,500 lb. mission gross (billed) weight:

User group	Estimated gross receipts (\$ millions) (\$ billions)	Estimated receipts (\$ millions) (\$ billions)	
		At 1 mill per gross ton-mile	At 2 mill per gross ton-mile
Scheduled air carriers	72,000	\$7,000	\$17,600
Other civil	1,200	600	1,200
Total	73,200	\$7,600	\$18,800

Estimated receipts from aircraft registration fees imposed on all aircraft up to 4,500 lb. mission gross (billed) weight:

Weight category (lb.)	Number of aircraft shipped	Estimated receipts (\$ millions) (\$ billions)	
		At 1 cent per aircraft	At 2 cents per aircraft
0-1,500	26,367	\$12,057	\$18,110
1,501-2,500	64,638	10,800	14,400
2,501-4,500	9,271	2,100	2,227
Total	94,276	\$36,487	\$58,737

SOURCE: Department of Commerce

and's were studying the revised sum charge proposal, although feeling with the state would stand on their present course.

► **Guide for Congress.** No specific recommendation was made. It was submitted to Congress as an objective report to be used "in framing and considering any new tax charge legislation."

The study feels the "golddust" charge method of obtaining operating funds the most desirable method of obtaining a return for the federal government. This approach has received considerable support in the past, both from the government and the industry and was favored in CAA's 1945 report on multiple taxation. In the Board's 1946 report of an investigation and research, and in CAA's 1950 report on a surcharge of CAA.

► **Measure of Use.** Chief merits of the plan are its simplicity and administrative simplicity, the study reports. Reasoning is that "the amount of fuel consumed in an aircraft is proportional to its weight, power and distance traveled

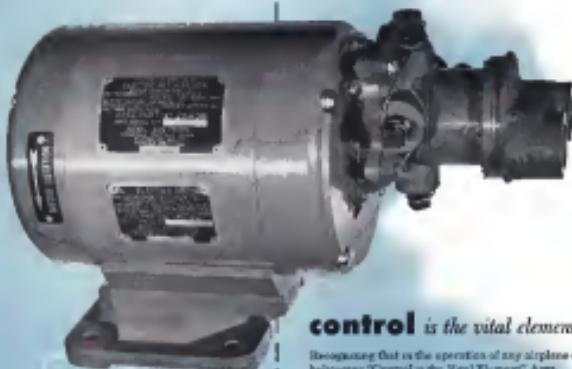
Thus, assuming that on some flights an aircraft is at school or potential use of the federal airways, the amount of gasoline consumed would receive both the use made of these facilities and the benefit derived from the use.

Commercial undelivered capacity fees would take the heaviest burden of the charge. Millions more of the federal airways system would not be included in the "golddust" charge, because such a route would involve much bookkeeping confusion.

Projected for fiscal 1955, CAA expects it would raise \$22,250,000 (less than a 10% cut from scheduled carriers if a 21 cent per gallon charge were imposed). Other civil carriers would contribute \$4 million a year.

In 1952, scheduled airline consumed approximately \$57 million gallons of aviation gasoline. Integrating carriers used 135 million gallons.

► **Adjustment Possible.** With the all of jet transports on the federal airways, the study says, the "golddust" charge could be adjusted to congressional. For variation, the report says. Indication



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use that first model of jet transports will carry twice as much payload as the current 747s.

As to collectors of the "allowance" charge, CAB suggests that it be collected at the treasury level at the time of the sale of the fuel, keeping administration of the levy and expense of collectors at a minimum.

For international airlines, a different charge per gallon would be required, the report says. Elsewhere, it is suggested that no foreign carrier charge be made until after the domestic non-refundable fuel has been matched.

A charge which was based on domestic areas would also be necessary to be expanded to international areas to cover costs and use because of the difference in the number of facilities needed per mile flown.

► **Allowance-charging problem** would be that a "allowance" charge should be levied on a uniform basis, because there is no way of determining at the nation level whether the fuel is to be used on domestic or international flights.

The group therefore urges fuel grade and aircraft registration for use as possible alternatives to the aviation gas tax.

The non-tire tax is seen as easy to calculate although complex to administer because of the involved presenting of operational reports that would be required.

The argument for idea similar to statewide registration tax was put to the Senate two years ago after Sen. John Sparkman, then chairman of the Small Business Committee, decried it as it probably doctored against small business. The bill, however, also would apply to scheduled air carriers.

Rep. Charles Wibleton, chairman of the House Commerce Committee, has introduced the bill in the House.

cause the fee would be paid in a timely manner, says the report.

For aircraft of more than 4,000 lbs gross takeoff weight, three types of charges are suggested:

- **Revenue tax**

- **Airline mileage**

- **Gasoline revenue**

"Domestic civil aviation appears to have reached a level of concession maturity which will permit it to make a reasonable contribution toward meeting the current costs of the federal airways system," the study reasons.

It points out that "approximately 96% of domestic revenue ton-miles were flown by airways-fee aircraft during fiscal 1971." The revenue level is nearly the same, though charges should also fall in line with the part as well as the prospective earnings of the carriers, and Congress, in deciding upon the national level, should avoid charges that would place an undue financial burden upon the industry.

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► **Voluntary Airlines**-CAB at present can take two choices with economic violations:

- Issue a command-decree order or revoke operating authority.
- Institute through a U.S. attorney civil action for an injunction or a criminal action.

The Senate Commerce Committee, in approving the legislation in July 1971, commented:

"From a practical standpoint, an injunction and revocation proceedings can only be used as a last resort in case of knowing and willful violations, and the criminal actions are not appropriate except in the most flagrant and serious cases."

"The only other existing remedies for economic violations—command-decree orders and injunctions—separate only against future conduct. Thus, an offender is in a position at this time, by causing a little caution, to engage in illegal practices and an enforcement action is commenced and may even continue with conduct during its pendency."

► **Swift Action**—"This proposal has to stop economic wrongdoing from widespread offenders over considerable periods of time and to reduce the danger of inciting unnecessary panics."

"Availability of civil penalties would tend to take the profit out of economic violations and, in this way, provide a strong deterrent to unlawful conduct."

"Experience has shown that swift and sure punishment is far more effective than heavy punishment too easily delayed. The civil penalty remedy would permit the Board to act swiftly in dealing with major offenders."

► **Communication stations** by "approximately 98% of non-airline stations" in the nation have two choices with economic violations:

- Issue a command-decree order or revoke operating authority.
- Institute through a U.S. attorney civil action for an injunction or a criminal action.

► **375 VOR Stations**—Rejection of the communication stations "would equal or better overall service to users of the federal airways at less cost to the public," he says.

There are 375 VOR stations commissioned and nearly 20,000 VOR stations available, making it possible to eliminate some of the old-time stations.

State Tests TVOR As Airways Extension

Minnesota's Department of Aviation is considering installation of TVORs (low-power omnidirectional) at present state airports to supplement the federal system, according to Commissioner L. L. Schlesinger.

The Minnesota project is in line with a Commerce Department proposal to test Federal agencies of securities that can be handled satisfactorily by local and state governments (AVIATION WEEK Aug. 18, p. 51).

An experimental TVOR, built and loaned by Marconi Electronics Corp., currently is installed at the Arden (Miss.) Municipal Airport, is undergoing evaluation.

Decision to buy TVORs will depend "as just as extensive of the VOR system," as part of the "extension of the system by the CAB, in part on the successful coordination of the federal radio navigation facilities with the federal system, and in part on cost," Schlesinger says.

The question of "extension" of VORs may refer to doubts raised by the commissioners over civil DME versus a more robust military system, called TACAN. So far as is known, the military has not proposed the elimination of VORs, although TACAN does provide both DME and VOR capability to reduce aircraft search time (AVIATION WEEK Dec. 7, p. 40).

The Arden TVOR, operating at full power at 168.8 MHz, is the first VOR accuracy improvement Schlesinger says. Minnesota has extended contracts to aviation officials of other states and cities to visit the Arden installation and several have accepted, he says.

Merge Put to Vote

Proposed merger of Pan Am and Continental Air Lines (AVIATION WEEK Dec. 28, p. 17) will be put to vote Feb. 27 at a special meeting of PAA stockholders in Dallas. Continental shareholders will vote 25 percent.

Sen. Johnson Asks Denny:

Does Politics Sway CAB Voting?

No, says Board member in Senate committee hearing, air transport policy is the only factor in decisions.

Concern over party-line voting in Civil Aeronautics Board decisions and possible influence over Board actions by the Undersecretary of Commerce for Transportation, or by members of Congress, was raised during a hearing before Senator Edward M. Kennedy (D-Mass.) and Senator John Sparkman (D-Ala.) on the Senate Committee on Commerce.

Since the Dec. 3 hearing in which Denny voted with the two CAB Democratic members—upheld the Board's authority to prevent senators in every mid-atlantic state from following party lines.

With the two Democrats dissenting, the Republican majority had resolved the operating authority of an Atlanta regional airport to Memphis International and awarded Atlanta service to the West, and southern American Airlines' direct New York-Memphis City routes.

Johnson specified that the question was given "a great deal of consideration" by the Board.

Johnson—"The Board provides that not more than three members of the CAB shall be appointed from the same political party. What is the reason for that,先生, in your opinion? Would you say it was intended to insure to the political party in power political control of the Board—or was it just to prevent the Senate from controlling the Board?"

Denny—"The reason that there should be not more than three from the same political party is that a majority board is the best way to operate a corporation, board or an independent board, that is to be able to make decisions. The decision holds a majority of political decisions, which should be avoided whenever possible."

Johnson—"You think that the majority party members of the Board, whether they be Democrats or Republicans, should have "strategic" influence from time to time, in order to get their agenda from the Administration—does that mean that their party's policy is before them, and they can affect upon the Board's actions to their own advantage?"

Denny—"Yes, sir. I think that the majority party members of the Board, whether they be Democrats or Republicans, should have "strategic" influence from time to time, in order to get their agenda from the Administration—does that mean that their party's policy is before them, and they can affect upon the Board's actions to their own advantage?"

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Denny—"My line would be that the aviation industry has better and the public interest is better protected by an independent quasi-judicial board than by a majority party or a majority of one political party." The most important reason for this is the great value of the deliberative service and the sharing of opinions."

Johnson's last question referred to the proposed reorganization of CAB as an independent commission and redesign of CAB under an undersecretary for air services (AVIATION WEEK Dec. 13, p. 14).



NAL Copter Serves Miami Area

National Air Lines' slender 535-seats passenger copter, one of three the carrier has on order, lands in a helipad located adjacent to the Miami Beach municipal airfield. NAL recently received three

permits approved from Civil Aeronautics Board to operate an experimental passenger copter service. Operations began Feb. 1 within a 100-mile radius of Miami (AVIATION WEEK Jan. 25, p. 88).

LA Airport Fights For Expansion Funds

Los Angeles-Lock of funds has blocked the long-range expansion program of the International Airport here at a time when traffic is at a record peak, according to the Department of Airport.

"The only method for completing the expansion will be through a bond issue," the department reports. Such a program, proposed for last November's election, failed to get the necessary two-thirds majority vote.

The city considered an airport expansion measure funds through general bonds, but increasing taxes and raising airport fees were not considered to be feasible. Such costly projects as expansion and modernization of runways.

Another attempt to obtain approval of voters will be made at next November's election.

■ **Record.** Gains-During 1951, record passenger traffic showed record gains. An all-time high of 2.5 million passengers and International traffic increasing 13% over 1950. Other records:

• All-night, biweekly, nonstop Blue 49 and Blue 16, 10% higher than the previous year.

• Traffic up 10% annually and 40% per year.

• Arrivals gained 11% to 30 million.

• Contract revenue for International and Sea Toward Valley Airport set a new high of \$1,886,500, 17% greater than in 1950.

■ **Marksmanship Methods.** "All of this activity makes the completion of future road to the airport a critical 'now,'" warns Robert A. McMillan, general manager of the airport department. "We are using every marksmanship method to do well with the handling of passengers, and luggage."

"If the City of Los Angeles is unable to hold its position in this coming year as one of the world's top centers, we must complete International Airport and be capable of handling three times the present volume of business."

■ **Expansion Stages.** At present the city utilizes only 1000 acres of the 3,888 acre land for airport purposes. Under development, as funds become available, is an extension of runways to accommodate all types of aircraft including transports to the heavier military and bombers.

For stages of the expansion, cells for an additional runway system to parallel the present main runway. Subsequent operation of both airports will be centralized as present facilities are operating at near capacity, the department reports.

■ **Airport Hand-Ups.** For immediate consideration of the construction and operation of a hotel on the airport. The Board of Airport Commissioners has radio study proposals submitted from hotel operators and airports letting a contract within six weeks.

The hotel site covers approximately five acres. Construction will be at the expense of the hotel operator, who will have exclusive rights.

Proposals being considered were submitted by Louis R. Rama of New York, William L. Tolley, Beverly Hills Airport, Inc., a group of Southern California businesses and Beckon, and Auger Construction Co., Beverly Hills.

as a whole in order to get full exhaustion of power.

■ **Two to 216.** Number of pilots lengthened by any single engine ranges from two to 216. Pan American World Airways had the greatest number, followed closely by Northwest Orient Airlines, Flying Tiger Line, Shik Airways, Transocean Air Lines and United Air Lines.

United took most of the sting out of its lengthening program by taking on 75 of its pilots as flight engineers. Several others are following suit, and more are negotiating terms with ground personnel.

CAB Sets Cause-In Three Crashes

Findings of several of various of weather conditions caused two airline DC-3 crashes last year and probably contributed to an accident that destroyed a C-46, Civil Aviators Board reports.

The three crashes—one scheduled flight and two military charter flights—killed a total of 50 persons.

■ **Backed-Up Headings.** In the DC-3 accident, CAB's conclusion is backed up by two Air Force pilots flying in the aircraft.

One reported a Delta Air Lines transport flight to encounter a severe thunderstorm shortly before it crossed east of Marshall, Tex., Mar. 17, killing three crew members and 17 of the 18 passengers aboard.

The other USAF pilot was flying on instruments near the route of a B-52 Convair aircraft less than an hour before the accident. Transport plunged into a 3,000 ft ridge southeast of Yuma, Wash., Sept. 1 in visual contact. Two crew members died in the wreckage.

The Air Force pilot said flying from the south east to McChord AFB, Wash., deviation of the Republic DC-3 would not have been possible at that time.

■ **Heavy Fog.** CAB says the final crash of an Associated Air Transport C-46 west of Fish River, Id., Jan. 7, was caused by turbulence that plagued the transport from its 13,000 ft east leg altitude. The pilot lost control because of low visibility but forced down the plane's descent, CAB found.

But the Board makes the exception that the exception might have been greater if some passengers had not outlasted pilots in anticipation of imminent severe weather.

These same reasons are given for the extensive lengthening:

- Transition of Korean flight
- Increasing unusual fluctuations
- General leveling off of airline industry

as a whole in order to get full exhaustion of power.

■ **Findings.** On the basis of its investigations, CAB hands down these findings in the three crashes:

■ **Data DC-3.** "Probable cause of this accident was (1) the incursion of conditions in a severe thunderstorm that resulted in loss of effective control of the aircraft and (2) the failure of the captain to adhere to company directions regarding the conduct of dual-deck when conditions would allow such action."

■ **Region DC-3.** "Probable cause of this accident was the pilot's attempt to continue flight under the presence of visual flight rules during instrument conditions."

■ **ATM C-46.** "Probable cause of this accident was the inadvertent descent into an area of turbulence and rising which resulted in the flight's inability to regain a safe altitude."

AA Attacks Eastern Action on Mexico

Attorney Archer charged that week that Eastern Air Lines' request for a stay against freezing of compensation of American's new New York-Mexico City route until Feb. 8 was "justifiable" in view of such investigations, hearing and decision by CAB, reduced fares are suspended until Aug. 15.

Mark S. Ardmore, to show cause why the stay should not be determined and put into effect, filed a \$1,255,500 motion for an injunction and removal of compensation to be paid the airline. It is equivalent to 45.25 cents per revenue-mile of scheduled operation.

■ **APPROVED.**

Reverent Air Lines agreed to issue Martin

distances. The airline said, "it is agreed for a suspension of compensation [Luis] to continue that principles of compensation call for ceasing as a U.S. carrier an unlawful restriction making its services 25% slower than a competitor's service of another country."

Two days after Eastern filed its case, Pan American World Airways also objected to CAB's American route

CAB ORDERS

(Jan. 30, 1952)

ORDERED

Investigation of solicited fares for Route Alaska route—proposed by Alaska Central Airlines, Elm Air Lines, Pan American World Airways, United Air Lines, Western Airlines, Western World Airways. Pending such investigation, hearing and decision by CAB, reduced fares are suspended until Aug. 15.

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They're flying on top of the world

Allison's service representative on assignment with the 318th Fighter-Interceptor Squadron at Thule Air Base didn't know he was writing an advertisement when he sent the following report—but we think you'll be interested in these comments from northern Greenland: "I am sending a few pictures taken at Thule shortly before old Sol set for its last time here in the Arctic. I am sure that these pictures will be of interest—with a caption indicating satisfactory performance of the Allison J33 engine even in these adverse conditions, some 800 miles from the geographic North Pole, and almost due east of the magnetic pole.

"The Air Echelon overseas movement of the 318th with Lockheed F-94B's was made from McChord Air Force Base, Washington to Thule. This move, made without incident, indicates not

only the pilots' capabilities and outstanding maintenance of equipment, but also the rugged dependability of the J33 engine. During the first four months of operation here, even with the onset of the Arctic night and extreme temperatures, this squadron is still logging hundreds of hours of combat-ready flight a month.

"I believe it would be quite fitting for Allison to indicate its appreciation of the Squadron's unrelenting confidence in the J33 engine and its prolonged effort toward making jet fighter operations both possible and practical in the far northern reaches of the globe."

Allison greatly appreciates this opportunity to salute the 318th Squadron of the Northeast Air Command for its splendid record in maintaining vigilant guard at the top of the world.



Allison DIVISION OF GENERAL MOTORS, INDIANAPOLIS, INDIANA